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Correlation Coefficient Analysis for Yield and Its Component Traits in Cluster Bean [*Cyamopsis tetragonoloba* (L.) Taub.] for Vegetable Pod Yield and Seed Yield Parameters

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A B S T R A C T

An experiment was carried out to know the correlation coefficient analysis for the 31 genotypes of cluster bean including check Pusa Navabhar. The investigation was laid out in RBD with three replication during *kharif*- 2015 at the vegetable research farm, Department of Horticulture SHIATS, Allahabad located in South-East part (Zone 4) of Uttar Pradesh. The mean sum of squares due to genotypes was significant for all the seventeen characters. The significant difference among the genotypes for all the characters under study suggested that there was ample scope for selection of promising cluster bean genotypes for vegetable yield and seed yield improvement. Correlation study revealed that pod length, pod breadth, ten fresh pod weight and vegetable pods per plant showed positive significant correlation with vegetable pod yield per plant. While dry pod yield per plant showed positive significant correlation with number of clusters per plant, number of pods per cluster, ten dry pod weight and ten dry pod seed weight, which indicates strong association with these character with yield per plant. Therefore by increasing the value of these components traits, yield may easily pushed up suggesting the selection for these characters will be useful in improving yield per plant

Introduction

Cluster bean [*Cyamopsis tetragonoloba* (L.) Taub.] belongs to family Leguminosae is an annual legume vegetable crop. It is a self-pollinated crop with diploid chromosome number 2n= 14. It is also known as Gawaar in Hindi & Marathi, Goruchikkudu kaya or Gokarakaya in Telugu, Gorikayie in Kannada and Kotthavarai in Tamil reported by (Vahrehvah.com, 2012). Guar is mainly cultivated for food, feed and fodder. Its young pods are used as vegetables, which also known for cheap source of energy (16 Kcal), moisture (8 g), protein (3.2 g), fat (1.4 g), carbohydrate(10.8 g), Vitamin A (65.3 IU), Vitamin C (49 mg), calcium (57 mg) and iron (4.5 mg) for every 100 g of edible portion (Kumar and Singh, 2002). Cluster bean is mainly exported to USA, Germany, Netherlands, Italy, UK, Japan and France etc worth of about 200 million rupees annually.(Singh *et al.*, 2009). The degree of association as revealed by correlation co-efficient is incomplete if the relative influence of the other characters to the calculated

correlation co-efficient is not evaluated as sometimes even a significant correlation gives the more shadow of the influence of other correlated characters. Correlation studies permit only a measure of relationship between two traits in order to improve the yield potential with-out sacrificing the special quality features, (Al-Jibouri *et al.,* 1958). With this back ground the present study was undertaken to identify Correlation coefficient for yield and its component traits in cluster bean.

Materials and Methods

The experiment was conducted with 31 genotypes of cluster bean including check Pusa Navabhar, in a randomized block design with three replications in *kharif*-2015. The plot size of single rows each with 3m length was followed with spacing of 45cm between rows and 20cm between the plants. Observations were recorded on five randomly selected plants in each replication of 17 different growth, vegetable yield and seed yield parameters *viz.*, plant height at 45 DAS (cm), plant height at 90 DAS (cm) number of branches per plant, days to fifty per cent flowering, days to first pod picking, pod length (cm), pod breadth (cm), ten fresh pod weight (g), vegetable pods per plant, vegetable pod yield per plant(g), number of clusters per plant, number of pods per cluster, ten dry pod weight (g), ten dry pod seed weight(g), number of seeds in 10 dry pod, 50 seed weight(g), dry pod yield per plant(g). Correlation coefficient analysis measures the mutual relationship between various plant characters. It helps to determine the component character on which selection can be made for genetic improvement. Correlation studies would provide reliable information on nature, extent and the direction of the selection. Correlation studies permit only a measure of relationship between two traits in order to improve the yield potential without sacrificing the special quality features, (Al-Jibouri *et al.,* 1958). The main objective of this study is to investigate correlation co-efficient for yield and its component traits in cluster bean genotypes for seed yield and vegetable yield parameter.

Results and Discussion

Based on the *per se* performance for vegetable yield and grain yield per plant, genotypes like, HG-3-100, HGS-884, AVT-1 GR-12 and IC 13496 for vegetable yield, as well as HG-04-875, HGS-881, RGC-1025, IC 3773 and check Pusa Navabhar for seed yield traits showed promising performance for vegetable pod yield and seed yield traits respectively. The mean sum of squares due to treatments was significant for all the seventeen characters. The significant difference among the genotypes for all the characters under study suggested that there was ample scope for selection of promising cluster bean genotypes for yield improvement. Similar finding is observed in Kumar *et al.,* (2015) Analysis of variance showed that there were significant differences among treatments for concerned characteristics, indicating wide variation among the genotypes. These findings of mean sum of squares are in accordance with the finding of Rai *et al.,* (2012), Mukherjee *et al.,* (2008) and Girish *et al.,* (2012) who also observed significant variability for yield and it's components in cluster bean.

Correlation coefficient analysis measures the mutual relationship between various plant characters and to determine the component character on which selection can be used for genetic improvement in yield while selecting the suitable plant type. In the present investigation the genotypic correlation coefficient of different character with seed yield per plant and their relationship among themselves are presented in table 2. It was found that seed yield per plant showed

positive significant correlation with number of clusters per plant (0.48**), number of pods per cluster (0.49**), ten dry pod weight (0.34**) and ten dry pod seed weight (0.29**), which indicates strong association with these character with seed yield per plant.

Therefore by increasing the value of these components traits, yield may easily pushed up suggesting the selection for these characters will be useful in improving seed yield per plant. The results are in agreement with the earlier findings in cluster bean by Girish *et al.*, (2012), for number of clusters per plant, number of pods per cluster, dry pod yield per plant and hundred seed weight and Rakesh *et al.*, (2011) for seeds per pod in cow pea and Manggoel *et al.*, (2012) also reported similar result for number of pods per plant and 100 seed weight.

Number of clusters per plant showed positive significant correlation with number of pods per cluster (0.43**) and seed yield per plant (0.48**) and number of pods per cluster showed positive significant correlation with seed yield per plant (0.48**) which indicates strong association with these two character. Similar results were obtained by Saini *et al.*, (2010). This indicated that selection of genotypes with higher number of cluster per selection of genotypes with high seed yield.

Table.1 Analysis of variance for different growth, vegetable and seed yield traits in cluster bean

S. No	Source of variation	Replication	Treatment	Error
1.	Plant height at 45 DAS (cm)	166.08	114.43**	6.05
2.	Plant height at 90 DAS (cm)	465.50	705.97**	48.55
3.	Number of branches per plant	7.70	66.99**	1.05
4.	Days to fifty per cent flowering	17.43	5.80**	2.83
5.	Days to first pod picking	43.19	15.69**	4.37
6.	Pod length (cm)	0.47	11.71**	0.18
7.	Pod breadth (cm)	0.004	0.026**	0.01
8.	Ten fresh pod weight (g)	47.21	153.21**	3.90
9.	Vegetable pods per plant	1504.13	10629.30**	544.48
10.	Vegetable pod yield per plant(g)	1879.8	4950.17**	330.03
11.	Number of clusters per plant	3.43	402.38**	11.70
12.	Number of pods per cluster	0.09	3.29**	0.69
13.	Ten dry pod weight(g)	0.67	2.59**	0.22
14.	Ten dry pod seed weight(g)	0.01	0.56**	0.06
15.	Number of seeds in 10 dry pod	15.63	142.19**	11.24
16.	50 seed weight(g)	0.01	0.24**	0.05
17.	Dry pod yield per plant(g)	0.32	1868.44**	0.66

All significant at 1% level

Table.2 Genotypic correlation for seed yield and its component characters in cluster bean

@	Number of clusters/plant	Number of pods/cluster	Ten dry pod weight (g)	Ten dry pod seed weight (g)	Number of seeds/10 dry pod	50 seed weight (g)	Seed yield/ plant (g)
Number of clusters/plant	1	0.43**	-0.10	-0.240*	0.03	-0.06	0.48**
Number of pods/cluster		1	-0.30	-0.146	-0.03	-0.48**	0.49**
Ten dry pod weight (g)			1	0.865**	0.47**	0.72**	0.34**
Ten dry pod seed weight (g)				1	0.53**	0.47**	0.29**
Number Of seeds/10 dry pod					1	0.37**	0.338
50 seed weight (g)						1	-0.01
Seed yield/ plant (g)							1

*Significant at 5% ** Significant at 1%

Table.3 Genotypic Correlations for vegetable pod yield and its component characters in cluster bean

@	Plant height at 45 DAS (cm)	Plant height at 90 DAS (cm)	Number of branches per plant	Days to 50% flowering	Days to first pod picking	Pod length (cm)	Pod breadth (cm)	Ten fresh pod weight (g)	Vegetable pods/plant	vegetable pod yield /plant (g)
Plant height at 45 DAS (cm)	1	-0.130	0.310**	-0.53**	-0.256*	-0.69**	-0.561**	-0.646**	0.704**	0.095
Plant height at 90 DAS (cm)		1	0.096	0.397**	0.197	0.570**	0.422**	0.543**	-0.367**	-0.170
Number of branches per plant.			1	-0.0837	-0.520**	0.006	-0.243*	-0.159	0.278**	0.025
Days to 50% flowering				1	0.336**	0.670**	0.714**	0.479**	-0.715**	-0.120
Days to first pod picking					1	0.160	0.511**	0.138	-0.084	0.140
Pod length (cm)						1	0.668**	0.932**	-0.706**	0.204**
Pod breadth (cm)							1	0.644**	-0.493**	0.243**
Ten fresh pod weight (g)								1	-0.734**	0.358**
Vegetable pods/plant									1	0.523**
vegetable pod yield /plant (g)										1

*Significant at 5% ** Significant at 1%

Ten dry pod seed weight showed positive significant correlation with number of seeds per ten pod (0.53**), fifty seed weight (0.47**) and seed yield per plant (0.29**) which indicates strong association with these character with seed yield per plant. Similar findings were reported by Girish *et al.*, (2012) for seed yield per plant trait. Similar findings were also reported by Hanchinmani (2003) for 100 seed weight. Hence, these characters have to be given importance during selection to improve the yield potential of the crop

In the present investigation the genotypic correlation coefficient of different character with vegetable pod yield per plant and their relationship among themselves are presented in table 3. It was found that vegetable pod yield per plant showed positive significant correlation with pod length (0.204**), pod breadth (0.243**), ten fresh pod weight (0.358**) and vegetable pods per plant (0.523**) which indicates strong association with these character with vegetable yield per plant.

Therefore by increasing the value of these components traits, yield may easily pushed up suggesting the selection for these characters will be useful in improving vegetable pod yield. Pod breadth showed positive significant association with plant height at 90 DAS (0.422**), days to fifty per cent flowering (0.714**), days to 1st picking (0.511**) and pod length (0.668**), which indicates strong association with these character with vegetable pod yield per plant. But the correlation showed negative significant association for the trait plant height at 45 DAS (-0.561**) and number of branches per plant (-0.243*) with vegetable pods yield per plant at genotypic level, negative and significant association indicates that selection on the basis of these characters will not be beneficial as increase in one character will decrease the other.

On the basis of above findings, it can be concluded that the charters like, number of clusters per plant, number of pods per cluster, ten dry pod weight (g) and ten dry pod seed weight (g) showed positive significant correlation with Seed yield per plant (g), as well as pod length, pod breadth, ten fresh pod weight vegetable pods per plant showed positive significant correlation with Vegetable pod yield per plant, these traits may be considered effective parameters of selection to increase seed yield in cluster bean.

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