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Research Article

Relationship between the yield contributing characters in cowpea for grain purpose [*vigna unguiculata* (l). Walp]

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Abstract
The experiment was conducted using fourteen genotypes of cowpea collected from different states in India to study the nature of genotypic association between the eight yield contributing characters and direct and indirect effects of the different characters on yield. The study revealed that the days to maturity, number of branches per plant and number of pods per plant showed positive significant correlation with seed yield. Path coefficient analysis exhibited days to fifty per cent flowering, plant height, pods per plant showed positive direct effect on yield except days to maturity, branches per plant, seeds per pod and hundred seed weight which showed negative direct effects. The characters plant stand at harvest and pods per plant exhibited moderate direct effects on yield. The implications of the results revealed that selection can be done for days to maturity, number of branches per plant and number of pods per plant for improving the grain yield in cowpea.

Key words: correlation, path coefficient, cowpea

Introduction

The major objective of crop breeding programmes is to achieve higher yield. Yield is regarded as an end product of a set of plant process which is related to each other. It is also a complex character with low heritability and therefore, direct selection for yield to improve it is often not so successful. Therefore, it is advantageous to find out the closely related and highly contributing component traits of yield, so that suitable selection strategies can be devised to improve yield. 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 (Kumar and Ojha, 2004). The path analysis helps in partitioning the correlation coefficients of yield components with seed yield into direct and indirect effects to ensure the actual contribution of an attributes as well as its influence through other traits.Keeping these concepts in view, investigations were planned on a set of cowpea genotypes to evolve a suitable selection strategy for the genetic improvement.

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Materials and Methods

The material comprised of fourteen diverse cowpea genotypes. These were evaluated at Agricultural College and Research Institute, Madurai. The experiments were laid out in a homogeneous block following randomized block design (RBD) with three replications at during kharif 2008. Nine rows each of 3m length and 3m breath consisted a plot. Row to row and plant to plant spacing were 30 and 45cm, respectively. Recommended agronomic practices were followed to raise the crop. Observation on nine quantitative characters viz., plant stand at harvest (PSHT), days to fifty per cent flowering (DFF), days to maturity (DM), plant height (PHT), branches per plant (BPP), pods per plant (PPP), seeds per pod (SPP), hundred seed weight (HSW) and grain yield per plot (GYPP) were recorded on five randomly selected plants in each treatment. The data were subjected to correlation coefficient (Burton and Devane, 1953) and path analysis (Dewey and Lu, 1959).

Results and discussion

The analysis of variance revealed highly significant differences among the genotypes for all the traits suggesting presence of sufficient variability in the material under investigation. The results of genotypic correlation (Table-1) revealed that the trait namely, days to fifty per cent flowering was highly positive significant with days to maturity. The trait plant height was highly positive significant with branches per plant and pods per plant. Considering the correlation between seed yield per plot and other characters, it was found that seed yield was positively and significantly correlated with days to maturity, branches per plant and pods per plant. Similar findings were reported by Renukadevi and Subbalakahmi (2006) for number of primary branches and number of pods per plant, Singh and Verma (1998) and Parmer *et al*., (2003). Hence, these characters namely days to maturity, branches per plant and pods per plant have to be given importance during selection to improve the yield potential of the crop.

The genotypic coefficient of correlation between different quantitative characters under study were subjected to path coefficient analysis for partitioning the direct and indirect effects of these characters on grain yield (Table-2), which was considered as dependent variable. In the presence study the characters plant stand at harvest, days to fifty per cent flowering, plant height and pods per plant showed positive direct effects on yield. These results imply that the association of these characters with yield is more valuable and selection based on these characters would be highly desirable for improving seed yield. Number of seeds per pod and peduncle length had higher direct effects on seed yield per plant which depicted a true relationship and selection based on these characters would be highly desirable for improving seed yield which is similar to the findings of Singh and Verma (1998), Parmer *et al*. (2003) and Philip (2004). The characters days to maturity, branches per plant, seeds per pod and hundred seed weight had negative impact on seed yield per plot. The characters days to fifty per cent flowering and plant height exhibited high direct effects on seed yield and the characters plant stand at harvest and pods per plant exhibited moderate direct effects on seed yield per plot.

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Table 1. Genotypic correlation coefficients between grain yield per plant and component characters

Characters	PSHT	DFF	DM	PHT	BPP	PPP	SPP	HSW	GYPP
PSHT	1.000	0.175	0.229	0.185	0.269	0.144	-0.229	-0.014	0.188
DFF		1.000	0.938**	-0.395	-0.376	-0.256	-0.296	-0.434	-0.348
DM			1.000	-0.418	-0.390	-0.239	-0.411	-0.502	-0.343
PHT				1.000	0.645**	0.481*	0.087	0.171	0.598*
BPP					1.000	0.289	-0.083	0.074	0.235
PPP						1.000	0.135	0.143	0.660**
SPP							1.000	0.050	0.148
HSW								1.000	-0.087
GYPP									1.000

*** Significant at 5% level, ** Significant at 1% level**

Table 2. Direct and Indirect effects of different characters on yield in cowpea

Characters	PSHT	DFF	DM	PHT	BPP	PPP	SPP	HSW	GYPP
PSHT	**0.26**	0.05	-0.20	0.09	-0.14	0.07	0.04	0.01	0.19
DFF	0.05	**0.27**	-0.81	-0.19	0.19	-0.13	0.06	0.22	-0.35
DM	0.06	0.25	**-0.86**	-0.20	0.20	-0.12	0.08	0.25	-0.34
PHT	0.05	-0.10	0.36	**0.49**	-0.33	0.24	-0.02	-0.09	0.60*
BPP	0.07	-0.10	0.34	0.31	**-0.51**	0.14	0.02	-0.04	0.24
PPP	0.04	-0.07	0.21	0.23	-0.15	**0.50**	-0.03	-0.07	0.66**
SPP	-0.06	-0.08	0.35	0.04	0.04	0.07	**-0.19**	-0.03	0.15
HSW	0.00	-0.12	0.43	0.08	-0.04	0.07	-0.01	**-0.51**	-0.09

Residual Effect: 0.4828

*** Significant at 5% level, ** Significant at 1% level.**