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RESEARCH ARTICLE

Studies on characters association and path analysis for seed yield and its components in pigeonpea

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SUMMARY

An investigation was carried out in pigeonpea to understand the association among the yield components and their direct and indirect effect on the seed yield. The estimates of genotypic correlation co-efficient in general were higher than their corresponding phenotypic correlation co-efficients indicating strong inherent association among the traits. Characters association studies indicated that number of pods, secondary branches per plant, plant height, primary branches per plant showed significantly positive correlation with seed yield at genotypic and phenotypic levels. Path co-efficient analysis revealed that number of pods, secondary branches per plant, plant height, and primary branches per plant were the most important character which can be strategically used to improve yield in pigeonpea. The study was carried out during 2009-10 to 2010-11 under International Central Research Institute for Semi Arid Tropics funded project at Department of Agricultural Botany, Marathwada Krishi Vidyapeeth, Parbhani.

Key Words : Correlation, Path analysis, Pigeonpea

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Pigeonpea [*Cajanus cajan* (L.) Millsp., (2n=22] is the fifth most important pulse crop in the world. In India, it is second (next to chickpea) in area a production. Yield is a complex character controlled by polygenes. Therefore, selection made on the basis of its phenotypic expression alone is likely to be misleading. Seed yield is a dependent trait, which is influenced by many independent traits. The correlation among the yield and yield contributing characters provides reliable information on nature and direction of selection also useful as a basis for selecting desirable plant type. Correlation co-efficient enables to identity characters or combination of characters, which might be useful as indications of high yield by way of evaluating the relative influence of various characters as well. It provides reliable information on the consequence of selection for simultaneous improvement of desirable yield component characters. Path co-efficient analysis is the best method to evaluate the causes and effect relationship between yield and its contributing traits the present study was undertaken to derive information on genotypic and phenotypic correlation, direct and indirect effect or various traits.

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MATERIALS AND METHODS

The material used in the present study consisted of 121 genotype were evaluated in Randomized Block Design with two replications during *Kharif* 2010-11 at department Agricultural Botany, Parbhani. The present study comprised of four lines *i.e.* ICPA-2043, ICPA-2047, ICPA-2078 and ICPA-2092 and 23 testers *i.e.* ICP-7192, ICP-9939, ICP-12320, ICP-12057, ICP-1482, ICPL-20108, ICPL-20120, BSMR-846, BSMR-736, BDN-2, BSMR-198, BSMR-571, BSMR-243, BSMR-174, BSMR-175, BSMR-253A, BWR-153, BSMR-539, BSMR-528, BWR-133, BWR-154, BWR-553, and BWR-123. The genotype 121 includes twenty seven parents (Four CGMS based lines and 23 tasters) together with 92 crosses, a standard check BSMR-736 and

one promising hybrid ICPH-2671. The experimental material comprised of 121 diverse genotypes of pigeonpea, collected from Agriculture Research Station, Badnapur and ICRISAT, Hyderabad. Each genotype was grown in one row of three meters length at 75 cm x 30 cm spacing. The recommended fertilized dose of 25:50:00 NPK kg/ha was applied. Cultural practices like weeding and plant protection measures were followed as and when required. Observations were recorded on five plants at random in each replication. The characters studied were days to 50 per cent flowering, days to maturity, plant height (cm), number of primary branches per plant, number of secondary branches per plant, number of pods per plant, number of seeds per plant, 100 seed weight and grain yield per plant. Phenotypic and genotypic correlation co-efficients were worked out for all possible combinations of characters as per the procedure outlined by Panse and Sukhatme (1985). Path analysis was carried out following the method suggested by Dewey and Lu (1959).

RESULTS AND DISCUSSION

Correlation co-efficient is an important statistical constant, which indicates the degree of association among the various characters. The genotypic correlation (Table 1) was higher than phenotypic correlation indicating strong

Table 1:Phenotypic(p) and genotypic (g) correlation between different characters in pigeonpea

	Characters		Days to 50 flowering	Days to maturity	Plant height (cm)	No.of pri. branches/ plant	No.of seco. branch / plant	No.of pods/ plant	No.of seeds/ pod	Test weight (g)	Yield /plant (g)
1.	Days to 50 % flowering	P	1.000	0.276**	0.242*	-0.192	-0.297**	-0.281**	0.022	-0.042	-0.298
		G	1.000	0.345**	-0.281**	-0.308**	-0.467**	-0.346**	0.027	-0.047	-0.0298
2.	Days to maturity	P		1.000	-0.050	-0.079	0.059	-0.113	-0.046	0.184	-0.117
		G		1.000	-0.040	-0.116	0.124	-0.146	0.144	0.231*	-0.123
3.	Plant height (cm)	P			1.000	0.257**	0.465**	0.411**	0.044	0.157	0.319**
		G			1.000	0.313**	0.657**	0.466**	0.196*	0.168	0.319**
4.	No. of pri. branch/ plant	P				1.000	0.521**	0.285**	0.103	-0.124	0.231*
		G				1.000	0.426	0.179	0.637**	-0.162	0.200*
5.	No. of seco. branch / plant	P					1.000	0.455**	-0.084	0.135	0.338**
		G					1.000	0.444**	-1.169**	-0.201	0.380**
6.	No. of pods / plant	P						1.000	0.071	-0.006	0.808**
		G						1.000	0.407	-0.004	0.856**
7.	No.of seeds / pod	P							1.000	-0.055	0.093
		G							1.000	-0.316**	0.682**
8.	Test weight (g)	P								1.000	0.035
		G								1.000	0.33
9.	Yield / plant (g)	P									1.000
		G									1.000

*and ** Indicate significance of value at P=0.05 and 0.01, respectively. P – Phenotypic correlation. G – Genotypic correlation.

Table 2: Direct (diagonal) and indirect (above and below diagonal) genotypic path effect of components on yield in pigeonpea

	Characters	Days to 50 flowering	Days to maturity	Plant Height (cm)	No.of pri Branches/ plant	No.of seco. Branch / plant	No.of pods/ plant	No.of seeds/ pod	Test weight (g)	Correlation with yield per plant
1.	Days to 50 % flowering	-0.062	0.006	0.026	-0.023	0.011	-0.304	-0.003	-0.005	-0.348
2.	Days to maturity	-0.020	0.018	0.004	-0.009	-0.003	-0.128	0.014	0.017	-0.123
3.	Plant heigh (cm)	0.017	-0.001	-0.094	0.024	-0.016	0.409	0.011	0.047	0.351**
4.	No.of pri. branch/ plant	0.019	-0.002	-0.029	0.075	-0.010	0.157	-0.010	-0.012	0.200*
5.	No.of seco.branch/plant	0.029	0.002	-0.062	0.032	-0.024	0.390	0.013	0.051	0.380**
6.	No.of pods / plant	0.021	-0.003	-0.044	0.013	-0.011	0.879	0.000	0.013	0.856**
7.	No.of seeds / pod	0.024	-0.013	-0.034	0.012	-0.021	0.479	0.012	0.310	0.682**
8.	Test weight (g)	0.003	0.004	-0.016	-0.012	-0.005	-0.004	0.063	0.450	0.033

Residual effect -0.2536.

inherent relationship among the characters studied. Analysis of variance revealed significant differences among entries for all traits. At genotypic and phonotypic level number of pods per plant, number of secondary branches per plant, plant height and number of primary branches per plant showed significantly positive correlation with seed yield at both phenotypic and genotypic levels and seeds per pod at genotypic level (Table 1). The results were supported by earlier finding of Firoz Mohamad *et al*. (2008) for number of secondary branches per plant and number of pods per plant, Sodavadiya *et al.* (2009) and Bhadru (2010) for number of pods per plant and Bhaskaran and Muthiah (2007) and Vange and Eggbe Moses (2009) for all the characters. This reveals the importance of these components increasing the seed yield. The highest degree of association between number of pod per plant is the most reliable component of yield and can be very well utilized as an indicator of grain yield, plant height showed positively significant correlation with number of secondary branches per plant (G = 0.657, P = 0.465), number of pods per plant (G= 0.466, p= 0.411) and number of primary branches per plant at both genotypic and phenotypic levels.

Days to 50 per cent flowering showed the positively significant correlation with days to maturity (G = 0.325, P = 0.276) and negatively significant with number of secondary branches per plant (G = -0.467, P = -0.297) at both genotypic and phenotypic levels. Number of primary branches per plant showed positively significant correlation with number of secondary branches per plant (G = 0.426, P = 0.521) at both genotypic and phenotypic levels. And also with number of seeds/pod (G = 0.637) at genotypic level and number of pods per plant (P = 0. 285) at phenotypic level. Number of secondary branches per plant showed positively significant correlation with number of pods/ plant (G = 0.444, P = 0.455) at both levels and negatively significant with number of seeds per pod (G = -1.109) at genotypic level.

The correlation co-efficients were inadequate to interpret the causes and effect relationships. However, path analysis technique furnishes a method portioning the correlation co-efficients between various characters into direct and an indirect effect provides the actual contribution of an attributes and its influence through the other traits. Number of pods per plant, number of seeds per pod, number of secondary branches and plant height had positive direct effect and strong significant association with seed yield respectively (Table 2). Similar results reported by Bhadru (2010), Bhaskaran and Muthiah (2007), Sodavidiya *et al*. (2009) for number of pods per plant, no. of seeds per pod, secondary branches, plant height selection based on these four character will improve the yield of pigeonpea. Number of pods per plant, test weight, number of primary branches per plant, days to maturity and number of seeds/pod. Plant height showed positive indirect effect via, number of pods per plant, followed by test weight, number of primary branches per plant, days to 50 per cent flowering, and number of seeds per pods. Results are in agreement of the earlier results reported by Bhadru (2010), Sodavidiya *et al*. (2009) and Vange and Moses (2009). Similarly number of pods per plant via days to 50 per cent flowering followed by number of primary branches and test weight, number of secondary branches per plant via. number of pods per plant followed by test weight, number of primary branches, days to 50 per cent flowering, no. of seeds per pod and days to maturity. Number of pods/plant via number of seed/ pod followed by test weight, days to 50 per cent flowering, test weight via no. of seeds per pod. The residual effect recorded 0.2536, it indicates the characters used in our experiment explain per cent variations which may attributed to higher yield in pigeonpea. This also emphasized to increase number of characters in future studies.

The result from correlation and path analysis indicated the no. of pods per plant, secondary branches per plant, plant height and primary branches per plant were the major yield contributing traits, as these characters not only showed positive and significant association with seed yield per plant, but also had high positive direct effect. Thus, number of pods, secondary and primary branches per plant could be considered as the important characters for selection in order to improve the seed yield in pigeonpea. Based on these seven traits associations were selected for further evaluation.

REFERENCES

Baskaran, K. and Muthiah, A.R. (2007). Association between yield and yield attributes in pigeonpea. *Legume Res.,* **30** (1): 64-64.

Bhadru, D. (2010). Correlation and path analysis for yield and its attributing traits in white coated pigeonpea (*Cajanus cajan* (L.) Millsp.) *Legume Res.,* **33** (3): 196-200.

Dewey, D.R. and Lu, K.H. (1959). A correlation and path co-efficient analysis of components of crested wheat grass seed production. *Agron. J.*, **51**: 515-518.

Firoz-Mohammad, Gowda, M.B. and Girish, G. (2008). Correlation a path analysis in pigeonpea. *Environ & Ecol.,* **24** S (Special 4): 1124-1129.

Sodavadiya, P.R., Pithia, M.S., Savaliya, J.J., Pansuriya, A.G. and Korat, V.P. (2009).Studies on character association and path analysis for seed yield and its components in pigeonpea. *Legume Res.,* **32** (3): 203-205.

Vange, T. and Egbe Moses, O. (2009). Studies on genetic characteristics of pigeonpea germplasm at otobi, benue state of Nigeria. *Worlds Agric. Sci.,* **5** (6): 714-719.

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