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# CORRELATION AND PATH COEFFICIENT ANALYSES IN PIGEONPEA

A. HENRY[1] and G.V.S.R. KRISHNA[2]

Central Arid Zone Research Institute, Jodhpur

**ABSTRACT**

Seed yield per plant in pigeonpea showed significant positive correlation with number of plant height, number of branches, number of clusters and number of seeds per pod. Similarly, path coefficient analysis indicated the importance of number of pods per plant, which had maximum direct effect on seed yield. However, characters like plant height, number of branches per plant, number of clusters per plant and number of seeds per pod affected seed yield via number of pods per plant. Therefore, selection based on early maturity, medium tall plant height, moderate number of branches per plant, number of clusters per plant, number of seeds per pod with more number of pods per plant and medium seed size is expected to improve the seed yield in pigeonpea.

KEY WORDS : Pigeonpea, Correlation, Path analysis.

The knowledge of interrelationship of plant characters with seed yield and among themselves is of paramount importance to the breeder for making improvement in a complex character like seed yield for which direct selection is not much effective. Path coefficient analysis provides an effective means of partitioning direct and indirect causes of association. It permits a critical look to recognize the specific forces acting to produce a given correlation and measures the relative importance of each causal factor. The present study was, therefore, undertaken to study the type of association and to judge the direct and indirect effect of various quantitative traits on seed yield.

## MATERIALS AND METHODS

Under rainfed conditions, 42 strains of pigeonpea (*Cajanus cajan* (Linn.) Millsp) having diverse characteristics were grown during rainy season of 1980, in a randomized block design with three replications. The individual plot size was 3 rows of 4 m length with plant spaced 20 cm apart. The interrow distance was 60 cm. The crop received a basal dressing of 20 kg N/ha and 40 kg P/ha. The total rainfall received during the cropping season was 230 mm. Five plants were selected at random from middle row of each plot for recording observations. Phenotypic and genotypic correlation coefficients for all

1. S-2 (Plant Breeding) 2. S-2 (Statistics)

**Table 1. Genotypic (upper right) and phenotypic (lower left) correlation coefficients between nine quantitative attributes in pigeonpea.**

| Character | Days to 50% flowering | Days to maturity | plant height | No.of branches /plant | No.of clusters/ plant | No.of pods/ plant | No.of seeds/ pod | 100 seed weight | Seed yield/ plant |
|---|---|---|---|---|---|---|---|---|---|
| Days to 50% flowering | – | 0.753 | 0.140 | 0.013 | -0.209 | -0.219 | -0.127 | 0.203 | -0.194 |
| Days to maturity | 0.742** | – | 0.086 | 0.041 | -0.125 | -0.248 | -0.102 | 0.257 | -0.235 |
| Plant height | 0.135 | 0.085 | – | 0.500 | 0.308 | 0.295 | 0.173 | -0.006 | 0.379 |
| No.of branches/ plant | 0.012 | 0.640 | 0.490** | – | 0.564 | 0.566 | 0.430 | 0.033 | 0.629 |
| No.of clusters/ plant | -0.203 | -0.123 | 0.305 | 0.557** | – | 0.863 | 0.366 | -0.091 | 0.857 |
| No.of pods/plant | -0.215* | -0.248* | 0.289** | 0.559** | 0.857** | – | 0.475 | -0.292 | 0.991 |
| No.of seeds/pod | -0.125 | -0.099 | 0.169 | 0.414** | 0.357** | 0.462** | – | -0.019 | 0.475 |
| 100 seed weight | 0.200 | 0.254* | -0.006 | 0.029 | -0.090 | -0.289** | -0.018 | – | -0.308 |
| Seed yield/plant | -0.169 | -0.213 | 0.353** | 0.577** | 0.790** | 0.916** | 0.426** | -0.285** | – |

* Significant at P = 0.05 ** Significant at P = 0.01

possible combinations were computed and path coefficients were worked out.

## RESULTS AND DISCUSSION

The analysis of variance indicated highly significant differences among the genotypes for all the characters. The genotypic and phenotypic correlation coefficients between grain yield and nine other matric traits are presented in Table 1. Genotypic correlation coefficients were of higher magnitude than their corresponding phenotypic correlation, suggesting that there was inherent relationship between the characters. Seed yield/plant was positively and significantly correlated with plant height, number of branches/plant, number of clusters/plant, number of pods/plant, number of seeds/pot. These findings are in agreement with report by Singh and Malhotra (1973), Wakankar and Yadav (1975), Ram *et al.* (1976), Dani (1979), Asawa *et al.* (1981) and Kumar and Reddy (1982). Among the component characters, number of pods/plant and number of seeds/pod were positively and significantly correlated with maximum number of characters (3 traits), followed by number of clusters/plant (2 traits), number of branches/plant, days to maturity and 100 seed weight positively and significantly associated with one trait each. A significant negative association of seed yield/plant was observed with 100 seed weight. Kumar and Reddy (1982) reported negative association of number of pods/plant with characters like days to flowering, days to maturity and 100 seed weight.

Results of path analysis (Table 2) revealed that the direct contribution of number of pods/plant was positive and highest on grain yield. Characters like plant height, number of branches/plant, number of clusters/plant which had significant associations with seed yield, were found to have low direct contribution towards seed yield. A low negative contribution was exhibited by number of seeds/pod, whereas, this character had positive and significant correlation with seed yield. All these characters contributed most towards seed yield through number of pods/plant. Similar results were reported by Kumar and Reddy (1982). The characters like days to flowering, days to maturity and 100 seed weight which had strong negative association with seed yield were found to

Table 2. **Direct (diagonal) and indirect effects of yield components on grain yield in pigeonpea**

| Character | Days to 50% flowering | Days to maturity | Plant height | No.of branches /plant | No.of clusters/ plant | No.of pods/ plant | No.of seeds/ pod | 100 seed weight | Genotypic correlation |
|---|---|---|---|---|---|---|---|---|---|
| Days to 50% flowering | 0.022 | -0.018 | 0.010 | 0.001 | -0.001 | -0.200 | 0.001 | -0.009 | -0.194 |
| Days to maturity | 0.017 | -0.024 | 0.006 | 0.003 | -0.001 | -0.226 | 0.001 | -0.011 | -0.235 |
| Plant height | 0.003 | -0.002 | 0.068 | 0.042 | 0.001 | 0.268 | -0.001 | 0.003 | 0.379 |
| No.of branches/ plant | 0.0003 | -0.001 | 0.034 | 0.083 | 0.003 | 0.515 | -0.003 | -0.001 | 0.629 |
| No.of clusters/ plant | -0.005 | 0.003 | 0.021 | 0.047 | 0.004 | 0.785 | -0.003 | 0.004 | 0.857 |
| No.of pods/plant | -0.005 | 0.006 | 0.020 | 0.047 | 0.004 | 0.910 | -0.003 | 0.012 | 0.991 |
| No.of seeds/pod | -0.003 | 0.003 | 0.012 | 0.036 | 0.002 | 0.432 | -0.007 | 0.001 | 0.474 |
| 100 seed weight | 0.005 | -0.006 | -0.0004 | 0.003 | -0.0004 | -0.266 | 0.0001 | -0.042 | -0.308 |

Residual effect = 0.005.

have low positive direct contribution in case of former character while low negative contribution was revealed for the latter two characters, respectively. These findings are in agreement with the findings of Asawa *et al.* (1981), Shoran (1982), Kumar and Reddy (1982). The contribution of days to maturity and days to flowering *via* number of pods/plant were negative, as would be expected that late maturing varieties under rainfed conditions experienced moisture stress during flowering and pod formation stage and hence reduced the pod number/plant considerably. It was also revealed that 100 seed weight and number of pods/plant were respectively, positively and negatively associated with maturity duration. Thus selection programme based on number of pods/plant, moderate number of branches/plant, plant height and number of seeds/pod would lead to further improvement in seed yield of pigeonpea under rainfed conditions.

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