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# Assessment and Implication of Selection Indices in $F_2$ Generation of Chickpea (*Cicer arientinum* L.)

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**A B S T R A C T**

Chickpea is the second most important pulse crop in the world after dry bean. The aim of this study was to estimate the correlation coefficients between seed yield, morphological traits and yield components. Six generation of chickpea of two crosses were evaluated at Botany Section Farm, College of Agriculture, Dhule (Maharashtra) during *Rabi*, 2017. The field experiment was arranged in a randomized block design (RBD) with three replications. Phenotypic correlation of grain yield per plant with nine other characters studied in $F_2$generation of two crosses indicated, significant and positive correlations with plant height, number of primary and secondary branches per plant, plant spread, number of pods per plant and 100-seed weight. These characters also showed significant and positive correlation among themselves uniformly. From the above observations the improvement in grain yield of chickpea appears to be possible by selection through aforesaid characters.

## Introduction

Chickpea (*Cicer arietinum* L.) is the second most important pulse crop in the world after dry bean. It is also the important pulse in India. Chickpea is an important source of human food and animal feed and helps to improve soil fertility, particularly in drylands. The rotation of chickpea and cereal can break the disease and pest cycle, and increase the productivity of the entire rotation. Yield is a multidimensional trait that encompasses several different properties and is affected by numerous factors. Yield is a complex character associated with many interrelated components. The application of relevant breeding criteria is very important in the process of breeding and selection of superior genotypes. Knowing the interdependence of morpho-physiological characteristics with yield is of utmost importance in order for successful breeding programs. The objective of this research was to estimates correlation coefficients between seed yield and the other traits in chickpea genotypes.

## Materials and Methods

The field experiment was conducted at Botany Section Farm, College of Agriculture, Dhule (India), with six different generation of two crosses. The experimental material were

evaluated in randomized block design with three replications. Recommended doses of fertilizers and cultural practices were adopted. Sowing was done in rows of 3.0 m length and 30 cm apart accommodating 40 plants at 10.0 cm distance between plants. Seeds were hand dibbled in each row. Two rows were assigned to $P_1$ and $P_2$ and 8 rows for $F_2$ generation for each cross. From each replication at random 40 plants from $F_2$ generation and 10 plants from parent plot were tagged for recording observations on ten characters viz., days to 50 per cent flowering, days to maturity, plant height, number of primary branches per plant, number of secondary branches per plant, plant spread, number of pods per plant, number of seeds per pod, 100-seed weight and grain yield per plant. For understanding the association among the yield and yield contributing characters, correlation coefficients were worked out by using the data of 120 $F_2$ plants in each cross separately, as per the procedure of Dewey and Lu (1959), given below

$$rPxy = \frac{Cov.\ xy}{\sqrt{Vx.Vy}}$$

Where,

Cov.xy = Covariance between the characters x and y

Vx = Variance of the character x

Vy = Variance of the character y

## Results and Discussion

Among the phenotypic correlation of grain yield per plant with nine other characters studied in $F_2$generation of two crosses, significant and positive correlations were observed with number of primary branches per plant, number of secondary branches per plant, plant spread, plant height, number of pods per plant and 100-seed weight. These characters also showed significant and positive correlation among themselves uniformly in the $F_2$ generation. Among these associations consistent and high values of correlation coefficient were obtained for grain yield with number of pods per plant (0.8852 to 0.9682) while, medium values were obtained for number of secondary branches (0.5676 to 0.6234), plant spread (0.4036 to 0.6005), 100-seed weight (0.3539 to 0.5682) and number of primary branches per plant (0.1873 to 0.2735), in cross 1 and 2, respectively. Significant association of these traits with grain yield have been previously reported by Talebi *et al.,* (2007) and Prakash (2013). He reported significant positive correlation among yield contributing characters like pod weight, pods per plant and 100-seed weight as observed in present study. He also reported maximum correlation (r=0.99) between grain yield and pod weight.

In all the two crosses there is the positive and significant correlation between grain yield per plant with number of primary branches per plant, number of secondary branches per plant, plant spread, number of pods per plant and 100-seed weight. These result are in accordance with those obtained byGirase and Deshmukh (2020); Muhammad *et al.,* (2004) and Vaghela *et al.,* (2009). While, Kobraee *et al*., (2010) reported grain yield had positive and highly significant correlation with plant height and number of pods per plant. Malik *et al.,* (2010) showed grain yield per plant had highly significant positive correlation with number of secondary branches per plant and number of pods per plant. Gaikwad and Monpara (2011) reported highly significant and positive correlation of grain yield per plant with number of pods per plant, secondary branches per plant and 100-seed weight. The correlation coefficient was positive between grain yield per plant and days to flowering and maturity (Table 1 and 2).

**Table.1** Phenotypic correlation coefficients between different pairs of characters in $F_2$ generation of cross 1(Vishal X Digvijay)

| Characters | Days to 50% maturity | Plant height | No. of primary branches/ plant | No. of secondary branches/ plant | Plant spread | No. of pods/plant | No. of seeds/pod | 100-seed weight | Grain yield/plant |
|---|---|---|---|---|---|---|---|---|---|
| **Days to 50% flowering** | 0.9022** | 0.0953 | 0.0389 | 0.0129 | 0.0626 | 0.0792 | -0.1033 | 0.1786* | 0.1151 |
| **Days to maturity** | - | 0.2060* | 0.0607 | -0.0222 | 0.0991 | 0.1037 | -0.1229 | 0.1214 | 0.1104 |
| **Plant height (cm)** | | - | 0.1750* | 0.1160 | 0.2156** | 0.3201** | -0.1437 | 0.0552 | 0.2765** |
| **Number of primary branches** | | | - | 0.3169** | 0.2821** | 0.2119** | -0.3087** | 0.2437** | 0.2735** |
| **Number of secondary branches** | | | | - | 0.6184** | 0.6208** | -0.3919** | 0.1994** | 0.6234** |
| **Plant spread** | | | | | - | 0.5697** | -0.2713** | 0.2600** | 0.6005** |
| **Number of pods per plant** | | | | | | - | -0.4732** | 0.1932** | 0.9682** |
| **Number of seeds per pod** | | | | | | | - | -0.1564* | -0.4285** |
| **100-seed weight(g)** | | | | | | | | - | 0.3539** |
| **Grain yield per plant(g)** | | | | | | | | | - |
| *** ,** Significant @ 5% and 1% level, respectively.** | | | | | | | | | |

**Table.2** Phenotypic correlation coefficients between different pairs of characters in $F_2$ generation of cross 2(PG-13107 X BDNG-797)

| Characters | Days to 50% maturity | Plant height | No. of primary branches/ plant | No. of secondary branches/ plant | Plant spread | No. of pods/plant | No. of seeds/pod | 100-seed weight | Grain yield/plant |
|---|---|---|---|---|---|---|---|---|---|
| **Days to 50% flowering** | 0.9440** | -0.0427 | -0.1386 | 0.1245 | 0.0281 | 0.0141 | 0.0183 | -0.0215 | 0.0064 |
| **Days to maturity** | - | -0.0909 | -0.0931 | 0.1136 | 0.0658 | 0.0225 | 0.0408 | -0.0529 | 0.0175 |
| **Plant height (cm)** | | - | 0.0810 | -0.0460 | 0.1201 | 0.1395 | -0.0682 | -0.1060 | 0.1053 |
| **Number of primary branches** | | | - | 0.1535* | 0.0715 | 0.2152** | -0.0581 | 0.0539 | 0.1873* |
| **Number of secondary branches** | | | | - | 0.5536** | 0.6190** | -0.0641 | 0.3323** | 0.5676** |
| **Plant spread** | | | | | - | 0.4683** | -0.0861 | 0.2249** | 0.4036** |
| **Number of pods per plant** | | | | | | - | -0.0779 | 0.5311** | 0.8852** |
| **Number of seeds per pod** | | | | | | | - | 0.0175 | 0.2250** |
| **100-seed weight(g)** | | | | | | | | - | 0.5682** |
| **Grain yield per plant(g)** | | | | | | | | | - |
| ***,** Significant at 5% and 1%, level, respectively** | | | | | | | | | |

The association between days to 50 per cent flowering and days to maturity in both the crosses were significantly positive, indicated that the genotype required more days for flowering are late for maturity. Such condition is desirable for irrigated condition in chickpea. Similar results were also reported by Girase and Deshmukh (2002).

Phenotypic correlation of number of pods per plant with grain yield was the highest in $F_2$ generations of both the crosses. This, association would be useful indirectly, as improvement in componential character through selection could result in improvement of single plant yield, as a result of expected correlated response. Bhushan and Jaiswal (2009) also reported similar results. The r values of grain yield with number of pods per plant, plant spread, number of secondary branches per plant, 100-seed weight and number of primary branches per plant ranges from 0.1873 to 0.9682, indicating that the values of these associations were not uniformly higher in $F_2$ generations of two crosses. The magnitude of correlated response of selection would be different in segregating generations. Any attempt to look for increase in r value may not be desirable for all association but for certain association like grain yield with 100-seed weight and number of pods per plant and number of seeds per pod with 100-seed weight is desirable. The presence of such plasticity in r value may provide more opportunity for better selection response.

Generally negative correlation has been existed between pod number and 100-seed weight but in present investigation consistently in both the crosses positive and significant correlations were observed; it might be due to breakdown of undesirable linkage between these characters in $F_2$ generation. The $F_2$ is highly segregating generation, which gives the opportunity of breakdown of undesirable linkage between the genes of number of pods per plant and number of seeds per pod with 100-seed weight. It makes possible to funnel out more pod number with more 100-seed weight recombinants.

In conclusion, the association of grain yield with number of primary branches per plant, number of secondary branches per plant, plant spread, number of pods per plant and 100-seed weight were different in $F_2$ generation of two crosses. However, based on the present investigation, it can be concluded that more emphasis will have to be given for number of primary branches per plant, number of secondary branches per plant, plant spread, number of pods per plant and 100-seed weight during selection. From the above observations the improvement in grain yield of chickpea appears to be possible by selection through aforesaid characters. Similar observations were also made by Girase and Deshmukh (2002).

## References

Bhushan, S. and H. K. Jaiswal. 2009. Correlation and path analysis in short duration chickpea. *Journal of Food Legumes*, 22(4): 302.

Dewey, D. R. and K. H. Lu. 1959. Correlation and path analysis of crested wheat grass seed production. *Journal of Agronomy*, 51: 515-518.

Gaikwad, S. R. and B. A. Monpara. 2011. Genetic variation in $F_2$ populations and their potential in the improvement of seed yield in chickpea (*Cicer arientinum* L.). *Journal of Agriculture Research and Technology*, 36(3): 527-530.

Girase, V. S. and R. B. Deshmukh. 2002. Transgressive segregation of grain yield and its components in Chickpea. *Journal of Maharashtra Agricultural*

*Universities*, 27(1): 015-018.

Kobraee, S., K. Shamsi, B. Rasekhi and S. Kobraee. 2010. Investigation of correlation analysis and relationships between seed yield and other quantitative traits in chickpea (*Cicer arientinum* L.). *African Journal of Biotechnology*, 9(16): 2342-2348.

Malik, S. R., A. Bakhsh, M. A. Asif, U. Iqbal and S. M. Iqbal. 2010. Assessment of genetic variability and interrelationship among some agronomic traits in chickpea. *International Journal of Agriculture and Biology*, 12(1): 81-85.

Muhammed Azharudheen, T. P. 2010. Evaluation of RILs for nutritional traits in groundnut (*Arachis hypogaea L.)*.M.Sc. (Agri.) Thesis, University of Agricultural Sciences, Dharwad, 36(3): 583-588.

Prakash, V. 2013.Component analysis for grain yield on chickpea (*Cicer arientinum* L.) under moisture deficit conditions. *Journal of Progressive Agriculture*, 4(1): 51-52.

Talebi, R., F. Farzad and N. B. Jelodar. 2007. Correlation and path coefficient analysis of yield and yield components of chickpea under dry land condition. *Asian Journal of Plant Sciences*, 6(7): 1151- 1154.

Vaghela, M. D., V. K. Poshiya, J. J. Savaliya, B. K. Davada and K. D. Mungra. 2009. Studies on character association and path analysis for seed yield and its components in chickpea (*Cicer arientinum* L.). *Legume Research*, 32(4): 245-249.

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