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Correlation and Regression Studies in Chickpea Genotypes

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Abstract

Association between the growth characters of plant height, number of primary branches per plant, number of pods per plant yield per plant and 100 seed mass were determined in 14 chickpea genotypes. Grain yield was positively correlated were number of primary branches, pods per plant, plant height and 100 seed mass. Multiple correlation of grain yield with plant height, number of primary branches, pods per plant and 100 seed mass was highly significant. The partial regression value were also significant.

Introduction

In Pakistan plant protein could be cheapest source to meet the alarming challenge of nutritional deficiency of food and feed, chickpea has long been recognized as important source of protein for diet and animal feed. With the rise in human as well as livestock population the consumption of chickpea has greatly increased and it has become essential to fulfil the requirement either through extending area or by increasing yield per unit area. The increase in acreage of chickpea crop is riot possible due to its competition with other cash crops. The only alternative left for raising the production per unit area is the development of high yielding genotypes. Grain yield is a complex character resulting from a host of contributing factors which are highly susceptible to environmental fluctuations. However, yield could be estimated on the basis of the performance of yield components and other closely related characters. Correlation analysis provides the information on correlated response of important plant characters and therefore, leads to directional model for yield. Many workers have expressed apprehension about total reliance on yield components analysis (Hardwick and Andrews, 1980).

Chand *et al.* (1975), Katiyar *et al.* (1977), Islam and Begum (1985), Abdullah (1986), Malik *et al.* (1988), Khan *et al.* (1989), Khan (1990), Gravois and Helms (1992) and Kato and Takeda (1996) reported that grain yield has positive relationship with plant height, number of branches, number of pods per plant and 100 seed mass. Present paper contains some information about the inter relationship of grain yield with some important plant characters. Such information will guide the plant breeder in planning chickpea improvement programme efficiently and effectively in future.

Materials and Methods

Fourteen chickpea genotypes of varying growth habits were planted in a randomized block design with three replication at International Crops Research Institute for Semi-Arid Tropics (ICRISAT), India. The plots were 4.0 m x 2 m with an intra-row spacing of 30 cm. The crop was raised with the recommended package of practices under irrigation. Five plants per plot were randomly selected for observations on yield per plant and other important ancillary characters such as plant height, number of primary branches, number of pods and 100 seed weight. Multiple correlation and partial regressions of grain yield with four ancillary characters were worked out and tested for significance according to Snedecor (1946) method. The multiple regression equation between grain yield and the four yield components was:

$Ya + b_{y1.234}x1 + b_{y2.134}x2 + b_{y3.124}x3 + b_{y4.123}x4$ where $b_{y1.234}$, $b_{y3.124}$ and $b_{y4.123}$ are the partial coefficients.

Results and Discussion

There was a highly significant positive correlation between grain yield and other important ancillary characters: plant height, number of primary branches, number of pods per plant and 100 seed mass (Table 1). Plant height had highly significant positive correlation with number of primary branches, number of pods per plant and 100 seed mass. The relationship between number of primary branches and number of pods was positive and high significant and positive and significant for number of primary branches and 100 seed mass. Number of pods was positive and highly significantly correlated with 100 seed mass.

The multiple correlation and partial regression value obtained for grain yield with plant height, number of primary branches, number of pods per plant and 100 seed mass are as below:

RY (1234)	=	0.655**
$b_{y1.234}$	=	0.0279**
$b_{y2.134}$	=	0.0163*
$b_{y3.124}$	=	0.0185*
$b_{y4.123}$	=	0.0179**

Where Y = Grain yield per plant
Y1 = Plant height (cm)
Y2 = Number of primary branches
Y3 = Number of pods per plant
Y4 = 100 seed mass.

The values showed that the multiple correlation of grain,

Table 1: Correlation between chickpea characters

Character	Plant height (cm)	No. of branches/ Plant	No. of pods per plant	100 seed mass (g)
Yield/plant (g)	0.616	0.231**	0.685**	0.715**
height (cm)		0.733**	0.835**	0.318**
Number of branches/plant			0.727**	0.180*
Number of pods per plant				0.310**

*Significant ($P < 0.05$); * * Highly significant ($P < 0.01$)

yield with plant height, number of primary branches, number of pods and 100 seed mass was highly significant. Keeping all the other components as constrain, the partial regression coefficient of grain yield with plant height was positive and highly significant. The partial regression between grain yield with number of primary branches was er positive and significant, keeping plant height, number of ld pods and 100 seed mass constant. The partial regression coefficient of grain yield with number of pods was positive and highly significant. Keeping plant height, number of primary branches and 100 seed mass constant. The partial ld regression coefficient of grain yield with 100 seed mass was positive and highly significant, keeping plant height, number of branches and pods constant.

The findings of this study are almost similar to the results that variability in yield upto 92 percent was accounted for by number of primary branches, plant height, number of pods per plant and elliptic index of leaf under normal field conditions. The results are also almost similar with the findings of Jain *et al.* (1991) who concluded that a combination of three characters viz. a Plant height, number of branches and pods per plant was superior to others and its relative contribution towards seed yield was 94 per cent under normal field conditions.

Our results differ from the findings of the Singh *et al.* (1991) who reported that 75 percent of the variation in seed yield was accounted for by the time to 50 percent flowering, time to maturity and 100 seed mass. The differences in results might be due to different genetic material used and the various environments under which the studies were under taken.

In foregoing discussion, it has been observed that grain yield had positive correlation with plant height, number of primary branches, number of pods per plant and 100 seed mass which showed that yield can be increased in chickpea by improving the above positive responsive parameters. Finally it is suggested that selection of chickpea must be in compromisation with plant height, number of primary branches, number of pods per plant and 100 seed mass as such characters contribute largely to the grain yield.

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References

Abdullah, A., 1986. Path co-efficient analysis in some gram traits. M.Sc. Thesis, University of Agriculture, Faisalabad.

Chand, H., E.S. Srivastawa and K.B. Trehan, 1975. Estimates of genetic parameters, correlation coefficients and path-coefficient analysis in gram (*Cicer arietinum* L.). Madras Agric. J., 62: 178-181.

Gravois, K.A. and R.S. Helms, 1992. Path analysis of rice yield and yield components as affected by seeding rate. Agron. J., 84: 1-4.

Hardwick, R.C. and D.J. Andrews, 1980. Genotypic and environmental variation in crop yield. A method of estimating the interdependence of the components of yield. Euphytica, 29: 177-188.

Islam, M.O. and B. Begum, 1985. Stability of chickpea variety for sowing date in Bangladesh. Int. J. Agric. Sci., 55: 228-232.

Jain, S.K., J.P. Khare, H.L. Sharma and J.P. Mehra, 1991. Multiple correlation and regression analysis in lentil. LENS Newslett., 18: 11-13.

Katiyar, R.P., J. Prasad, A.B. Singh and K. Ram, 1977. Association analysis of grain yield and its components in segregating populations of chickpea. Indian J. Agric. Sci., 47: 325-327.

Kato, T. and K. Takeda, 1996. Associations among characters related to yield sink capacity in space-planted rice. Crop Sci., 36: 1135-1139.

Khan, I.A., M. Bashir and B.A. Malik, 1989. Character association and their implication in chickpea breeding. Pak. J. Agric. Sci., 26: 214-220.

Khan, N.I., 1990. Variability and character association in wheat. J. Agric. Res., 28: 193-200.

Malik, B.A., I.A. Khan and M.R. Malik, 1988. Genetic variability and correlation among metric traits in chickpea. Pak. J. Agric. Res., 9: 352-354.

Singh, K.B., G. Bejiga, M.C. Saxena and M. Singh, 1991. Transferability of selection indices from drought-free to drought-prone environments in chickpea. Int. Chickpea Newslett., 24: 19-22.

Snedecor, G.W., 1946. Statistical Methods. 14th Edn., The Iowa State College Press, USA., pp: 340-373.