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RESEARCH PAPER

Correlation studies for seed yield and its components in chickpea (*Cicer arientinum* L.) germplasm

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Abstract : The association between seed yield and yield contributing characters was studied by using 41 chickpea genotypes. The characters *viz*. number of pods per plant, 100 seed weight, harvest index, number of secondary branches per plant and plant height recorded a highly positive significant correlation with seed yield at both genotypic and phenotypic levels. This indicates the simultaneous improvement of these characters through selection.

Key Words : Correlation, Genotypic, Phenotypic, Chickpea, Seed yield

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INTRODUCTION

Chickpea (*Cicer arietinum* L.), also known as Gram, Bengal Gram, Garbanzo bean and Egyptian pea is a quality source of protein (23%), total carbohydrate (64%), fat (5.0%) crude fibre (6.0%), andash (2.0%), besides containing phosphorus (340mg/100g), calcium (190mg/100g), magnesium (140mg/100g), iron (7mg/100g) and zinc (3mg/100g) (Jukanti *et al*., 2012).

In Maharashtra, Amravati district leads in chickpea production, with a share of 8%, followed by Ahmadnagar (7%), Akola (7%), Hingoli (6%), Washim (5%), Buldhana (5%), Latur (5%), Osmanabad (5%), Nagpur (5%), Jalgaon (5%), Nanded (5%) and other district in the state by 38%.

Estimation of the correlation between yield and other traits is useful in selecting desired plant traits for designing an effective breeding procedure. The correlation co-efficient measures the degree of association and also the genetic or non-genetic relationship between two or more traits which forms the basis for selection. It estimates the effect of independent yield attributes upon the dependent variable economic yield. In the present investigation, we studied the correlation between the seed yield and its components in chickpea (*Cicer arientinum* L.) germplasm.

MATERIAL AND METHODS

The present investigation was conducted during the *Rabi* season of 2021-2022 at the College of Agriculture, VNMKV, Badnapur campus, Maharashtra, India. The

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experimental material consisted of 41 diverse genotypes of chickpea including five standard checks *viz.* Akash (BDNG-797), Digvijay, Vijay, Phule Vikram and JAKI 9218. These genotypes were evaluated in RBD (Randomized Block Design) with two replications. Genotypes was sown in one row of 4 m length with the spacing of 45 cm for row to row and 10 cm for plant to plant. Observations were recorded for ten traits *viz.,* days to 50% flowering, days to maturity, plant height, number of primary branches per plant, number of secondary branches per plant, number of pods per plant, number of seeds per pod, 100 seed weight, seed yield per plant and harvest index. Appropriate variances and co-variances were used for calculating phenotypic and genotypic correlation co-efficients (Johnson *et al.,* 1955).

RESULTS AND DISCUSSION

Genotypic correlation co-efficients were generally higher than their corresponding phenotypic correlation coefficients for most of the characters, while in some cases phenotypic correlation co-efficients were higher than the genotypic, that maybe attributed to the environmental influence. The values of phenotypical correlation co-efficients are shown in Table 1 and genotypical correlation co-efficients are shown in Table 2.

Seed yield per plant had significant positive correlation with number of pods per plant (p=0.6488; g=0.6096), 100 seed weight (p=0.6065; g=0.6664), harvest index (p=0.5174; g=0.7310), number of secondary branches per plant (p=0.3623; g=0.3662) and plant height (p=0.3480; g=0.3649) at both phenotypic and genotypic level.

Days to 50 per cent flowering showed a significant positive correlation at both phenotypic and genotypic level with days to maturity (p=0.5824; g=0.6581) and number of seeds per pod (p=0.2810; g=0.3477),while it had the significant negative association with number of primary branches per plant (p= -0.2471; g= -0.2971), both at phenotypic and genotypic level.

Days to maturity showed a significant positive correlation both at phenotypic and genotypic levels with plant height (p=0.3944; g=0.4170), harvest index (p=0.2303; g=0.2391) and 100 seed weight (p=0.2213; g=0.3801). The character plant height had a positively significant correlation with 100 seed weight (p=0.4754; g=0.5077) and days to maturity (p=0.3944; g=0.4170) both at phenotypic and genotypic level and harvest index

Table 1 : Phenotypic correlation co-efficients for seed yield per plant with its components in chickpea

Characters	Days to 50 % flowering	Days to maturity	Plant height (cm)	Number of primary branches/ Plant	Number of secondary branches/ plant	Number of pods/ plant	Number of seeds/pod	100 seed weight (g)	Harvest index (%)	Seed yield /plant (g)
	1	2	3	4	5	6	7	8	9	10
Days to 50% flowering	1.000	0.5824**	0.1877	-0.2471*	-0.0734	-0.0971	0.2810*	-0.0857	0.0791	-0.1278
Days to maturity		1.000	0.3944**	-0.1376	-0.0412	-0.0299	0.1361	0.2213	0.2303*	0.0969
Plant height(cm)			1.000	-0.1068	0.1609	0.1750	0.1411	0.4754**	0.2072	0.3480**
Number of primary branches per plant				1.000	0.2127*	-0.2106	0.0402	-0.0837	-0.1271	-0.1476
Number of secondary branches per plant					1.000	0.2815*	0.0474	0.1183	0.1052	0.3623**
Number of pods Per plant						1.000	-0.2364*	-0.0586	0.2563*	0.6488**
Number of seeds per pod							1.000	0.0837	-0.1188	-0.1316
100 seed weight (g)								1.000	0.4736**	0.6065**
Harvest index (%)									1.000	0.5174**
Seed yield per Plant (g)										1.000

* and ** indicate significance of values at P=0.05 and 0.01, repectively

Table 2 : Genotypical correlation co-efficients for seed yield per plant with its components in chickpea

Characters	Days to 50 % Flowering	Days to maturity	Plant height (cm)	Number of primary branches/ Plant	Number of secondary branches/ plant	Number of pods/ plant	Number of seeds/pod	100 seed weight (g)	Harvest index (%)	Seed yield /plant(g)
	1	2	3	4	5	6	7	8	9	10
Days to 50% flowering	1.000	0.6581**	0.2139	-0.2971*	-0.0992	-0.1255	0.3477**	-0.0938	0.2148	-0.1400
Days to maturity		1.000	0.4170**	-0.1889	-0.920	-0.0667	0.1684	0.2391	0.3801**	0.0906
Plant height (cm)			1.000	-0.1203	0.1909	0.1743	0.1441	0.5077**	0.3349*	0.3649**
Number of primary branches per plant				1.000	0.2186*	-0.2417	0.0614	-0.0838	-0.2417	-0.1613
Number of secondary branches per plant					1.000	0.2552**	-0.0076	0.1639	0.0643	0.3662**
Number of pods Per plant						1.000	-0.3462**	-0.0627	0.3527**	0.6096**
Number of seeds per pod							1.000	0.1234	-0.2844*	-0.2133
100 seed weight (g)								1.000	0.6343**	0.6664**
Harvest index (%)									1.000	0.7310**
Seed yield per plant (g)										1.000

* and ** indicate significance of values at P=0.05 and 0.01, respectively

(g=0.3349) at genotypic level.

The number of primary branches per plant showed a significant negative correlation with days to 50 % flowering (p=-0.2471; g=-02971), at both phenotypic and genotypic levels,while it had a significant positive correlation with the number of secondary branches (p=0.2127; g=0.2186). The number of secondary branches per plant showed a significant positive correlation at both phenotypic and genotypic levels with number of pods per plant (p=0.2815; g=0.2552) and number of primary branches (p=0.2127; g=0.2186).

The number of pods per plant showed a significant positive correlation with harvest index (p=0.2563; g=0.3527) and number of secondary branches (p=0.2815; g=0.2552) both at phenotypic and genotypic levels,while it had negative correlation with numbers of seeds per pod (p= -0.2364; g= -0.3462).

100 seed weight showed a significant positive correlation with the number of harvest index (p=0.4736; g=0.6343) and plant height (p=0.4754 g=0.5077) at both phenotypic and genotypic levels. Harvest index showed a significant positive correlation with 100 seed weight (p=0.4736; g=0.6343), days to maturity (p= 0.2303; g=0.3801), and number of pods per plant (p= 0.2563; g=0.3527) both at phenotypic and genotypic level and number plant height (g=0.3349) at the genotypic level, while it showed asignificant negative correlation with number of seeds per pod (g= -0.2844) at genotypic level.

In the current study, the genotypic correlation co-efficients were greater than the phenotypic correlation co-efficients, showing that, while there is an intrinsic association between the characters analyzed, the environment has little influence in determining these associations as reported by Johanson *et al*. (1955).

The characters *viz.,* number of pods per plant, 100 seed weight, harvest index, number of secondary branches per plant, and plant height recorded a highly positive significant correlation with seed yield at both genotypic and phenotypic levels. In other words, an increase in the magnitude of these characters would lead to an increase in the magnitude of seed yield.

Earlier studies too have indicated such a positive significant correlation for the number of pods per plant by Guler *et al.* (2001). Arshad et al. (2004) found that seed yield had a positive and significant correlation with number of pods per plant, plant height and 100 seed weight. Vaghela *et al.* (2009) found that seed yield per plant has a significant and positive correlation with the number of pods per plant, number of primary branches per plant, harvest index and 100 seed weight at genotypic as well as phenotypic levels. Gohil and Patel (2010) reported that 100 seed weight, harvest index, number of

pods per plant, and number of seeds per pod have a positive significant relationship with seed yield per plant.

Yucel and Anlarsel (2010) found significant and positive relationships between seed yield and harvest index. Akhtar *et al.* (2011) observed that seed yield per plant had a significant and positive correlation with 100 seed weight, number of pods per plant, and plant height. Babbar *et al.* (2012) reported that seed yield per plant showed a highly significant and positive correlation with the number of seeds per pod, number of pods per plant, plant height, and 100 seed weight. Bhanu *et al.* (2017) found a positive significant relationship between seed yield, and number of pods per plant, number of secondary branches.

Conclusion :

The characters *viz.* number of pods per plant, 100 seed weight, harvest index, number of secondary branches per plant, and plant height recorded a highly positive significant correlation with seed yield at both genotypic and phenotypic levels. This indicates the simultaneous improvement of these characters through selection.

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Conflict of interest :

There is no conflict of interest

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