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ESTIMATES CORRELATION COEFFICIENT AMONG YIELD AND YIELD ATTRIBUTING TRAITS IN TWENTY CHICKPEA GENOTYPES

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Abstract

An experiment was conducted in The University of Agriculture, Peshawar, Pakistan during growing season 2013 to estimate correlation coefficient among yield and yield attributing traits in twenty chickpea genotypes. Total of (10 desi and 10 kabuli) genotypes were grown in a randomized complete block design with three replications. Plant height showed positive and highly significant correlation with 100-seed weight, while negative and highly significant correlation recorded with seeds pod^{-1} and harvest index. Secondary branches exhibited positive significant association with pods plant^{-1} and 100-seed weight while negative significant interrelationship found with seeds pod^{-1} and harvest index. Pods plant^{-1} revealed negative significant association with seed yield (kg ha^{-1}), seeds pod^{-1} and harvest index. Positive correlation of seeds pod^{-1} presented with harvest index. Highly significant and positive correlation of seed yield (kg ha^{-1}) was observed with harvest index and seeds pod^{-1}, while significantly negative relationship observed with 100-seed weight. Harvest index and seeds pod^{-1} would be the appropriate selection criteria for better seed yield in chickpea.

Keywords: Chickpea, Correlation, Seed yield and Genotypes.

INTRODUCTION

Chickpea (*Cicer arietinum* L.), also known as gram or chana, is one of the most basic food legumes cultivated by man and acting an energetic role in human nutrition and agricultural organization. It belongs to family Leguminosae and genus Cicer, almost all Cicer species have 2n=2x=16 chromosomes. In worldwide among the yearly seed crops, chickpea grades 14th in terms of area and 16th in production (Knights *et al.*, 2007). Two separate types of chickpea are familiar, i.e. Desi and Kabuli. In Desi chickpea, the seed colours combinations of brown, yellow, green and black. The flowers are usually pink and the plants show various degrees of anthocyanin pigmentation, although some Desi types have white flowers and no anthocyanin pigmentation on the stem. The Kabuli type chickpeas are categorized by white coloured seed, thin seed coat, white flowers, smooth seed surface, and lack of anthocyanin pigmentation on the stem. As compared to Desi types, the Kabuli types have higher levels of sucrose and lower levels of fibre. The Kabuli types mostly have large sized seeds and receive higher market price the Desi types (Gaur *et al.*, 2010). The correlation between seed yield and yield components is essential in determining selection criteria. Genotypic and phenotypic correlations are of value to indicate the degree to which various quantitative traits of the plant are associated with economic productivity. Correlation study thus provides information on correlate response of important plant traits and therefore leads to a directional model for yield response (Naveed *et al.*,2012). The methods to make significant improvement in chickpea production to require information on nature and magnitude of genetic variation in quantitative characters and their inter-relationship comprising different genotypes in a population, which are important fundamentals for regular breeding programme (Arshad *et al.*,2003). Keeping in view the present investigations were planned to estimate correlation coefficient among yield and yield attributing traits in chickpea.

MATERIALS AND METHODS

The experiment to estimate correlation coefficient among yield and yield attributing traits in twenty chickpea genotypes (10 desi and 10 kabuli) was conducted at the experimental area, University of Agriculture, Peshawar during growing season 2013-14. The experimental material comprises of 10 Desi and 10 Kabuli chickpea genotypes, which were evaluated in the field in a randomized complete block design with three replications. The experimental plot comprised of four rows, each having 4 meter length. Row to row and plant-to-plant spaces were 30 and 10 cm, respectively.

Statistical Analysis: The correlation of seed yield with other yield components was worked out according to Kwon and Torrie (1964).

RESULTS AND DISCUSSIONS

Plant height: Plant height revealed positive and highly significant relationship with 100-seed weight (r = 0.63**), while negative and highly significant association with seeds pod^{-1} (r = -0.49**), and harvest index (r = -0.59**). Positive and non-significant correlation of plant height showed with branches plant^{-1} (r = 0.01^{ns}), pods plant^{-1} (r = 0.24^{ns}) and seed yield (r = 0.01^{ns}) (Table 1). Azar *et al.* (2013) also showed similar results that positive and highly significant relationship of plant height with 100-seed weight and negative highly significant relationship of this trait showed with harvest index. Ramanappa *et al.* (2013) reported positive and highly significant relationship of plant height with seeds pod^{-1}.

Secondary branches plant^{-1}: Secondary branches plant^{-1} was found positive and highly significantly associated with pods plant^{-1} (r = 0.42**). Positive and significant relationship of secondary branches plant^{-1} was found with 100-seed weight (r = 0.32*), while negative and significant correlation was recorded with seeds pod^{-1} (r = -0.26*) and harvest index (r = -0.30*). Positive and non-significant correlation of secondary branches plant^{-1} was found with plant height (r = 0.01^{ns}), while negative and non-significant association of this trait showed with seed yield plot^{-1} (r = -0.24^{ns}) and seed yield (r = -0.24^{ns}) (Table 1). Malik *et al.* (2010) and Yucel *et al.* (2006) also reported similar results that positive and highly significant association of secondary branches plant^{-1} with pods plant^{-1} and harvest index. Whereas, Ali and Ahsan (2012) reported positive and significant association of this trait recorded with pods plant^{-1}.

Pods plant^{-1}: Positive and highly significant correlation of pods plant^{-1} was found with secondary branches plant^{-1} (r = 0.69**). Positive and significant association of pods plant^{-1} revealed with 100-seed weight (r = 0.29*), while negative and significant relationship of this trait was recorded with seeds pod^{-1} (r = -0.32*) and harvest index (r = -0.32*). Pods plant^{-1} was observed positive and non-significant correlation with plant height (r = 0.24 ^{ns}), while negative and non-significant association of this trait was found with seed yield (r = -0.12 ^{ns}) (Table 1). Azar *et al.* (2013) reported similar results pods plant^{-1} was positive and significantly correlated with 100-seed weight and harvest index. Gul *et al.* (2013) and Qureshi *et al.* (2004) also observed similar results positive and highly significant association of pods plant^{-1} with secondary branches plant^{-1}, 100-seed weight and harvest index.

Seeds pod^{-1}: Seeds pod^{-1} had observed positive and highly significant association with harvest index (r = 0.58**), while negative and highly significant relationship of this trait was found with plant height (r = -0.499**) and 100-seed weight (r = -0.63**). Positive and significant correlation of seeds pod^{-1} was recorded with seed yield (r = 0.26*), while this trait showed negative and significant association with secondary branches plant^{-1} (r = -0.26*) and pods plant^{-1} (r = -0.32*) (Table 1). Ali *et al.* (2013) reported similar results positive and significant correlation of seeds pod^{-1} showed with secondary branches plant^{-1}, 100-seed weight, while negative relationship with plant height. Ramanappa *et al.* (2013) also found significant correlation of this trait with pods plant^{-1} and plant height.

100-seed weight (g): Association values presented in Table (1) shows positive and highly significant correlation of 100-seed weight with plant height (r = 0.63**), while negative and highly significant relationship of this trait was found with seeds pod^{-1} (r = -0.63**) and harvest index (r = -0.63**). Positive and significant correlation of 100-seed weight was observed with secondary branches plant^{-1} (r = 0.32*) and pods plant^{-1} (r = 0.29*), while negative and significant association of this trait was recorded with seed yield (r = -0.26*) (Table 1). Azar *et al.* (2013), Padmavathi *et al.* (2013) also reported positive and significant correlation of 100-seed weight was found with pods plant^{-1}, plant height and harvest index. Ramanappa *et al.* (2013) and Malik *et al.* (2010) also originated negative and significant association of this trait with secondary branches plant^{-1}, pods plant^{-1}, while positive highly significant with harvest index.

Seed yield (kg ha^{-1}): Seed yield displayed positive and highly significant correlation was recorded with harvest index (r = 0.42**). Positive and significant association of seed yield was found with seeds pod^{-1} (r = 0.26*), while negative and significant relationship of this trait recorded with 100-seed weight (r = -0.26*). Seed yield was observed positive and non-significant correlation revealed with plant height (r = 0.01^{ns}), while negative and non-significant association showed with secondary branches plant^{-1} (r = -0.24^{ns}), pods plant^{-1} (r = -0.12^{ns}) (Table 1). Shamsi *et al.* (2010) also reported positive and highly significant association of seed yield recorded with harvest index and 100-seed weight. Farshadfar *et al.* (2013) also found positive and highly significant relationship of this trait with 100-seed weight and seeds pod^{-1}.

Harvest Index (%): Positive and highly significant association of harvest index revealed with seed yield (r = 0.42**) and seeds pod^{-1} (r = 0.58**), while negative and highly significant relationship of this trait was found with plant height (r = -0.59**) and 100-seed weight (r = -0.63**). Negative and significant association of harvest index was recorded with secondary branches plant^{-1} (r = -0.30*) and pods plant^{-1} (r = -0.32*) (Table 1). Padmavathi *et al.* (2013) reported similar positive and highly significant association of harvest index with plant height and pods plant^{-1}. Ramanappa *et al.* (2013) also reported highly significant association of harvest index with plant height, pods plant^{-1} and 100-seed weight.

Table 1. Correlation between plant height (PH), Secondary branches per plant (SBP), Pods per plant (PPD), Number of seed per pod (SPP), 100-seed weight (HSW), Seed yield kg ha^{-1} (SYKH) and Harvest index (HI).

	SBP	PPD	SPP	HSW	SYKH	HI
PH	0.01 ^{ns}	0.24 ^{ns}	-0.49**	0.63**	0.01 ^{ns}	-0.59**
SBP		0.42**	-0.26*	0.32*	-0.24 ^{ns}	-0.30*
PPD			-0.32*	0.29*	-0.12 ^{ns}	-0.32*
SPP				-0.63**	0.26*	0.58**
HSW					-0.26*	-0.63**
SYKH						0.42**

*, ** = Significant at 5% and 1% probability, respectively whereas ns = Non-significant.

CONCLUSIONS

Seed yield and yield attributing traits revealed positive and significant association which each other. Seed yield (kg ha^{-1}) was observed highly significant interrelationship with harvest index and seeds pod^{-1}, while negatively significant relationship showed with 100-seed weight. Harvest index, seed yield (kg ha^{-1}) and seeds pod^{-1} would be the appropriate selection criteria for better seed yield in chickpea genotypes.

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