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Research Article

Evaluation of Genetic Assortment and Relationships among Different Yield Contributing Characters in Chickpea (*Cicer arietinum*)

Muhammad Aslam[1], Muhammad Sulaman Saeed[1*], Shahid Sattar[1], Shoukat Sajad[2], Muhammad Sajjad[2], Mohsin Iqbal[2], Muhammad Rehan[3] and Ayesha Saeed[4]

[1]Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad, Pakistan

[2]Institute of Horticultural Sciences, University of Agriculture, Faisalabad, Pakistan

[3]Department of Agronomy, University of Agriculture, Faisalabad, Pakistan

[4]Department of Botany, University of Education, Dera Ghazi Khan Campus, Sub Campus of University of Education, Lahore, Pakistan

*Corresponding Author E-mail: sulaman_saeed@yahoo.com

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ABSTRACT

Among the pulses, chickpea (Cicer arietinum) is an imperative crop. The objective of the study was to assess the morphological diversity in in plant. The twenty cultivars and eleven morphological characters were engaged in this case. Genotype 1140, 7044 and 1120 had maximum number of days to flowering. And the genotype 95103 had minimum (113.3) number of days to flowering. The maximum number of days (165.02) to development/maturity were noted in 1207 and minimum (156.03) were in 7018. The cultivar 1006 was the genotype which scored highest height 73.13 cm. The highest pods in single plant were in genotype 102 having 24.64 pods and other variety, 1207 had 24 pods. The 810 genotype had the most grains in single pod (1.726). Almost similar were in 1115 as were 1.720. Pod length was on peak (2.79 cm) in genotype 6011 followed by 2.72 cm in 1207. 7044 genotype got the least pod length as was on 2.0 cm. The highest 100 grain weight was in 7044 which was 26.80 g. The maximum grain yield per plant was in 7044 that was 18.030 g, so this cultivar was more profitable than the others. It was discovered that significant genetic changeability existed among the genotypes for the characters under study. The genotypes were identified as inherently diverse and can be engaged in forthcoming chickpea enhancement series.

Keywords: *Chickpea, Genetic Diversity, Variability, Correlation*

INTRODUCTION

Pulses play a vital role in the field of agriculture to carry on the safe and sound lives of humans. Besides having richness in protein, also withstand output in cropping system. These are popular for comprising the ability to fix nitrogen (atmospheric) that is considered environmentally sounder and economically acceptable (Khoiwal et al., 2017).

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The genus consists of 34 wild perennials, 8 annual wild and 1 annual grown species. Chickpea is considered as one of the most primitive crop. It was under cultivation at the time when the oldest civilizations of Middle-East and South Asia were excavated (Noor et al., 2003). It belongs to family Fabaceae (Nawaz et al., 2017). Chickpea, also a pulse, is the third supreme vital vegetable on the planet consisting space of 11.550 million hectares and total production of 10.46 million tons (FAOSTAT 2013; Vijayakumar et al., 2017).

It is one of the most imperative crops among pulses. It contributes respectable financial incomes to the growers due to the chief Rabi legume crop cultivated in the rain fed areas, where it has the involvement of 88.0% of the aggregate area. In province, the Punjab, the area under farming embraces Thar and other connecting districts i.e. Khushab, Bhakkar, Layyah, Mianwali and in some portions of Jhang (Ali et al., 2011).

It is usually less costly and rich reserve for protein both for humans and animals. It encompasses protein (19.50%), fats (1.40%), ash (4.89%), carbohydrates (57.0-60.0%) and moisture (4.90- 15.6%) (Ali et al., 2011). It is very rich reserve for essential amino acids (tryptophan and lysine) whereas cereals lack these amino acids. Chickpea acts as a good source of balanced diet when it is taken in combination with cereals (Mushtaq et al., 2013). Its grains are used as flour, salads, cooked and ground into a paste which is locally known as basin, roasted, spiced and eaten as a snack (Al-Rifaee et al., 2007).

The production of chickpea is governed by many respects including cultivars, growing period, geographical zone, and agronomical adopted practices (Tawaha et al., 2005). Moreover, in a specific chickpea variety grain produce is a reliability of various profit paying attributes and has been made the permanent purpose of the plant breeders and researchers (Saleem et al., 2002).

Mainly food legumes, consisting of Faba beans, lentils, peas, beans and chickpea are known as very important sources of vegetable proteins which can add supplements in animal's protein diets. Moreover, significance in peoples' common diets, they have somewhat particular attention in crop rotations, diversification of production and environment protection by reducing the use of pesticides and nitrogen fertilizers (Melki et al., 2011).

Approximation of genetic miscellany is very compulsory to upsurge the inherent potential of a little breeding scheme for plant breeders. Essentially, data of the countless yield causal traits and their association offers the elementary awareness to plant breeder for chosing of extraordinary yielding assortments (Malek et al., 2014).

The objective of the present-day task was to assess the inter-relationship of numerous yield features, to discover yield components and to judge the genetic unevenness among various traits.

MATERIALS AND METHODS

The test material contained twenty world class reproducing lines including two business assortments of chickpea to be named 110, 7044, 12048, 6011, 7018, 1006, 1001, 1118, 1115,1016, 95103, 1270, 1120, 120 1140, 1103, Wnhar-2000, 810, 7000, Noor-2009. The plant-to-plant and "line to line separations were retained 15 and 30 cm separately.

1. **Days taken to blossoming/flowering (DTF)**

The information was recorded from the date of scattering the seeds to the date when over half plants inside a passage demonstrated rise of first blossom and the mean value was known.

2. **Days taken to development/maturity (DTM)**

Days engaged to development were verified when 90% plants inside a passage changed to brown colored and prepared for obtaining. The quantities of days were figured from the date of scattering seeds to the date of development and normal or mean was determined.

3. **Primary/Major branches in a plant (PBP)**

The twigs emerging from the peak or nodule of basal were checked from every one of the chosen plant and means were gotten.

4. Secondary/subordinate branches per plant (SBP)

The branches emerging from the essential or primary branches were considered the auxiliary branches per plant for each haphazardly chosen plant and afterward the normal was taken.

5. Plant tallness/height (PH)

At the point when plants development was stopped and their colour turned brown, tallness of 10 arbitrarily chosen plants from every section was estimated in centimeters starting from the earliest stage up to the top of the canopy of the plants with the assistance of meter-rod and means were taken.

6. Pods for every plant (PPP)

The units were isolated and checked from each chosen plant in the wake of reaping, cases of all the ten plant of a genotype were include and mean was known. Just very much filled pods were incorporated into the counting.

7. Grains for every pod (GPP)

Ten plants were chosen from every genotype inside a repetition. All the filled ones from each plant were shelled, included and grains delivered were numbered.

8. Pod length (PL)

To decide the pod length arbitrarily chose plants inside a rehash and estimated in centimeters scale. At that point normal was worked out.

9. 100-grains weight (GW)

Three arbitrary examples of 100-grains from the mass delivered from each plot were took, weighted independently in gram utilizing an electronic device. Later the mean was considered.

10. Biomass for every plant (BPP)

The plants were deliberately displaced, desiccated and weighted in gram with the assistance of electronic device and mean weight was extracted.

11. Grain yield for every plant (GYP)

The sum amount of grains got from every single one of the chosen plants was independently weighed in gram utilizing electric device and afterward partitioned by the numbers of plants and mean was acquired.

RCBD was applied with Tukey Test for comparing the means of various characters.

RESULTS AND DISCUSSIONS

Days taken to blossoming/flowering extended from 113.30 to 124.63 days. Genotype 1140, 7044 and 1120 had maximum number of days to flowering. And the genotype 95103 had minimum (113.3) number of days to flowering. This was supported by the scientists, Ali et al. (2008). The maximum number of days (165.02) to development/maturity were noted in 1207 and minimum (156.03) were in 7018. Bicer et al. 2014 and Atta et al. (2008) concluded this variability in this parameter. The primary branches ranged from 2.85 to 2.15 in all genotypes. The highest number of branches were in 1140 and 810 having 2.85 and 2.83 branches per plant respectively. These were same upto some extent with the Noor et al. (2003) and Idrees et al. (2006). The two genotypes comprised the highest secondary branches, those were 7000 and 1207 having 6.55 and 6.51 branches per plant respectively. The least number of branches were in 1115 which had 4.62 branches in it. This variability was proved by Atta et al. (2008). The cultivar 1006 was the genotype which scored highest height 73.13 cm. 7044 was on 2nd number in this case which had 72.103 cm height. Minimum was attained by 1060 genotype that had 60.637 cm height. This variability was also shown by Ozcelik and Bozoglu (2004). The highest pods in single plant were in genotype 102 having 24.64 pods and other variety, 1207 had 24 pods. These both had the highest number of pods. The minimum pods were 16.27, and were in 7000. These were also in the research of Singh et al. (2001) with some contradiction. The 810 genotype had the most grains in single pod (1.726). Almost similar were in 1115 as were 1.720. The least were in 1207 that were 1.46. Saleem et al. (2005) reported same variability. Pod length was on peak (2.79 cm) in genotype 6011 followed by 2.72 cm in 1207. 7044 genotype got the least pod length as was on 2.0 cm. For this trait, Kumar et al. (2003) reported same results. The highest 100 grain weight was in 7044 which was 26.80 g. And slightly less was in 1115 which was 25.29 g. The lowest weight

was showed by the genotype 1120 having 15.43 g. Yadav et al. (2003) had same results with some contradiction. The other character, biomass was maximum (70.293 g) in the 7044. And least (16.66 g) was assessed in the 95103. This character ranged from 16.66 g to 70.293 g. These results were in agreement with Hassan et al. (2008). The maximum grain yield per plant was in 7044 that was 18.030 g. Minimum was in 102 that was 10.073 g. Rehman (2000) also reported this great variability.

The complete description is there in table 1 and correlation is depicted in Table 2.

Table 1: Descriptive statistics regarding quantitative characters

Variable	Obs.	Obs. with missing	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
DTF	20	0	20	113.330	124.760	117.605	2.539
DTM	20	0	20	156.160	165.660	160.962	2.248
PBP	20	0	20	2.160	2.900	2.456	0.194
SBP	20	0	20	4.630	6.400	5.866	0.414
PH	20	0	20	60.660	73.330	67.719	3.385
PPP	20	0	20	16.330	24.660	20.721	2.398
GPP	20	0	20	1.460	1.750	1.577	0.082
PL	20	0	20	2.000	2.770	2.501	0.221
GW	20	0	20	15.500	26.830	21.827	2.728
BPP	20	0	20	16.670	70.330	62.621	11.435
GYP	20	0	20	10.000	18.000	13.407	1.855

Table 2: Correlation coefficient

Variables	DTF	DTM	PBP	SBP	PH	PPP	GPP	PL	GW	BPP	GYP
DTF											
DTM	0.221										
PBP	0.297	-0.113									
SBP	0.194	0.435	0.046								
PH	0.411	0.094	0.183	0.107							
PPP	0.287	0.280	0.319	-0.031	**0.450**						
GPP	0.137	-0.171	0.268	-0.379	0.293	0.392					
PL	-0.215	0.304	-0.075	-0.041	0.241	0.362	0.020				
GW	-0.036	-0.124	0.121	-0.178	0.273	0.170	0.120	-0.022			
BPP	0.306	-0.052	0.156	0.140	0.420	0.256	0.065	0.156	-0.143		
GYP	-0.120	-0.131	0.025	-0.339	0.136	0.019	-0.104	-0.143	**0.735**	-0.056	

CONCLUSION

It was discovered that significant genetic changeability existed among the genotypes for the characters under study. The genotypes were identified as inherently diverse and can be engaged in forthcoming chickpea enhancement series. The correlation matrix table revealed that there is strong and positive association between grain yield per plant and 100-grains weight. Also there existed intermediate, significant and positive correlation between plant height and pods per plant.

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