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PERFORMANCE OF SOME WHEAT VARIETIES ON THE BASIS OF YIELD AND YIELD CONTRIBUTING CHARACTERS

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ABSTRACT

This research work was performed to evaluate the performance of six wheat varieties including Mehran, TD-1, Kiran, Moomal, TJ-83 and Khirman for yield and its associated traits during 2013-14at Botanical Garden, Department of Plant Breeding and Genetics, Faculty of Crop Production, Sindh Agriculture University Tandojam. All the varieties were also examined for correlation coefficient among yield and its interlinked characters. The results revealed that yield and its associated traits of wheat varieties like plant height, grains spike^{-1}, spike length, spikelets spike^{-1}, seed index and grain yield plant^{-1} differed significantly ($P<0.05$) among wheat varieties; while tillers plant^{-1}were not different significantly ($P>0.05$). The variety Mehran-89 produced plants of maximum height (96.81cm), spikelets spike^{-1} (20.45), grains spike^{-1} (62.95), tillers plant^{-1} (5.80) and grain yield plant^{-1} (9.18 g), and spike length was maximum (11.94 cm) in Kiran-95, while the value for seed index was highest (23.51 g) in variety TD-1.The correlation coefficient for yield and its contributing traits of wheat varieties showed a positive and significant ($P < 0.05$) association of plant height and grains spike^{-1} ($r = 0.5541$); spike length v/s spikelets spike^{-1} ($r = 0.5986$), spike length v/s grains spike^{-1} ($r = 0.6667$), spikelets spike^{-1} v/s grains spike^{-1} ($r = 0.5592$) and tillers plant^{-1} v/s grain yield ($r = 0.8145$); while negative and significant ($r = - 0.5085$) correlation was calculated between plant height and seed index.

Key-words: Bread wheat, correlation coefficients, yield, yield contributing characters

INTRODUCTION

Wheat (*Tritium aestivum* L.) is a leading cereal crop. It provides 20 % of total energy requirement in our food (Shewry, 2009). Among the all cereal crops wheat occupies main position and also leading crop of the temperate climate of the world like rice in tropic climate crops. In Pakistan the average wheat yields is2787 kg ha^{-1} against the world average of 3086 kg ha^{-1}, USA 3018 kg ha^{-1}, China 4762 kg ha^{-1} and India 2801 kg ha^{-1}(GOP, 2013). Most of the plant breeders studied phenotypic correlation of different grain yield contributing traits with grain yield for the improvement of its genetic makeup (Shahid *et al*., 2002; Aycecik and Yildirim, 2006). Kashif *et al.*(2007) also observed that yield contributing traits such as tillers plant^{-1} showed significantly associated with grain yield^{-1}. Some other breeders such as Aycicek and Yildirim (2006) reported that plant height, spike length, spikelets spike^{-1} and 1000-grain weight were genetically positive and significantly correlated with grain yield^{-1}. Correlation is a main breeding aspects used for assessing the degree of interrelations of various yield contributing traits with the grain yield (Ali *et al*., 2009). Khan and Dar (2009) found the significant and positive interrelationship between grain yield and number of spikelets plant^{-1}, followed by number of tillers and 100-seed weight at both phenotypic and genotypic levels. Therefore, the correlations between yield and its associated traits should be known in breeding programs (Turk and Celik, 2006). The main focus of any wheat improvement project is to increase grain yield, for this purpose plant breeders require sufficient information on their parental materials in respect of variation for yields and its associated features. For this purpose, the correlation is used to express the extent of relationship between yield associated traits and grain yield ha^{-1} (Kara and Akman, 2007). Therefore, the present research work was performed to assess the performance of different wheat varieties on the basis of yield and its associated traits.

MATERIALS AND METHODS

The present research work was conducted to assess the performance of wheat genotypes for yield and its associated traits. On the above objective, the experiment was laid out during the Rabi season of 2013-14. The experimental material comprised of six commonly cultivated wheat genotypes i.e. Mehran, TD-1, Kiran, Moomal,

TJ-83 and Khirman. Four lines of each wheat variety were sown in RCBD under four replicated trials at Botanical Garden, Department of Plant Breeding and Genetics, Faculty of Crop Production, Sindh Agriculture University Tandojam, Sindh, Pakistan. The sowing was done by drilling method with plant to plant and row to row distance was 15 and 30 cm, respectively. At the time of maturity 10 plants were randomly selected were labeled in each replication of all the genotypes and the data was collected for the traits plant height, spikelet's spike^{-1}, grains spike^{-1} , spike length, tillers plant^{-1}, seed index and grain yield plant^{-1} After collecting necessary data under field conditions, further observations were recorded at the laboratory. The analysis of variance, mean comparisons and correlation were derived through Statistixv.8.1 computer software.

RESULTS AND DISCUSSION

Analysis of variance

The wheat varieties were evaluated for their agronomic performance, studying growth and yield components. The mean squares drawn from the analysis of variance for the traits such as plant height, spike length, spikelets spike^{-1}, grains spike^{-1}, tillers plant^{-1}, grain yield plant^{-1} and seed index are shown in Table 1. The mean squares showed that all the studied were significantly differed ($P < 0.05$) among the used genetic resources except tillers plant^{-1}. This indicates that these varieties possess genetic variability; hence may be exploited for further breeding experiments. These results are also in consonance to Baloch *et al.* (2016) and Ferede and Worede (2016).

Table 1.Mean squares from analysis of variances for various traits in bread wheat varieties.

Source of Variation	D.F.	Plant height	Spike length	No. of spikelets spike^{-1}	No. of grains spike^{-1}	No. of Tillers plant^{-1}	Grain yield plant^{-1}	Seed index
Replications	3	9.30	0.12	1.25	24.17	2.11	1.19	1.75
Genotypes	5	466.28**	1.36**	3.68*	89.35**	1.09^{NS}	3.09**	20.97**
Error	15	2.28	0.23	1.04	13.06	0.4537	0.3860	3.3692

**, * = Significant at 1 and 5% of probability level, respectively; NS = Non-significant

Mean performance

Mean performance of all investigated traits are given in Table 2. The results showed that variety Mehran-89 produced plants of maximum height (96.81 cm), followed by Khirman with 94.25 cm However, variety TD-1 produced the plants of minimum height (67.25 cm. Longest spike length (11.94 cm) was recorded in variety Kiran-95, followed by TJ-83, with 11.77 cm spike length; however the shortest spike length (10.53 cm) was noted in the variety Khirman. The number of spikelets spike^{-1} was significantly ($P < 0.01$) highest (20.45) in variety Mehran-89, followed by varieties Kiran-95, 18.80spikelets spike; while the minimum number of spikelets spike^{-1} (17.76) were produced by dwarf variety TD-1^{1}. The number of grains spike^{-1} was significantly ($P < 0.01$) highest (62.92) in variety Mehran-89, closely followed by TJ-83, Kiran-95 with 62.55, grains spike^{-1}; while the minimum number of grains spike^{-1} (50.35) were observed in dwarf variety TD-1. The number of tillers plant^{-1} was significantly ($P < 0.01$) highest (5.80) in variety Mehran-89, followed by variety TD-1 producing 5.60 tillers plant^{-1}. Varieties Khairman and Moomal produced 4.90 and 4.80 tillers plant^{-1}, while the minimum number of tillers (4.40) plant^{-1} was produced by variety Kiran-95. The grain yield plant^{-1} was significantly ($P < 0.01$) highest (9.18 g) in commercial variety Mehran-89, followed by variety TD-1 with average grain yield of 8.97 g. variety TJ-83 and Kiran-95 produced grain yield of 7.41 g and 7.36 g plant^{-1}; while the minimum grain yield of 7.29 g was produced by Khirman. The seed index values was significantly ($P<0.01$) maximum (23.51 g) in genotype TD-1, followed by variety Kiran-95, with seed index value of 22.92 g. However, the minimum seed index value of 17.64 g was noted in genotype Moomal.

Table 2. Mean values for different agronomic traits in bread wheat genotypes.

Genotypes	Plant height (cm)	Spike length (cm)	No. of spikelets spike^{-1}	No. of grains spike^{-1}	No. of Tillers plant^{-1}	Grain yield Plant^{-1} (g)	Seed index (g)
Mehran	96.81 a	11.55 a	20.45 a	62.95 a	5.80 a	9.18 a	20.36 b
TD-1	67.25 e	10.69 b	17.76 c	50.35 c	5.60 a	8.97 a	23.51 a
Kiran	89.30 c	11.94 a	18.80 a	60.25 a	4.40 b	7.36 b	22.92 a
Moomal	89.75 c	11.55 a	18.15 b	59.00 a	5.20 a	8.62 a	17.64 c
TJ-83	81.25 d	11.77 a	18.75 a	62.55 a	4.80 b	7.41 b	21.93 b
Khirman	94.25 b	10.53 b	18.10 b	56.10 b	4.90 a	7.29 b	19.07 c
LSD 0.05	2.28	0.73	1.73	5.45	1.01	0.93	2.76

Table 3. Correlation coefficients (r) between various traits in wheat cultivars.

Characters	Plant height	Spike length	Spikelets spike^{-1}	Grains spike^{-1}	Tillers plant^{-1}	Grain yield plant^{-1}
Spike length	0.2094^{NS}					
Spikelets spike^{-1}	0.3832^{NS}	0.5986^{**}				
Grains spike^{-1}	0.5541^{**}	0.6667^{**}	0.5592^{**}			
Tillers plant^{-1}	-0.0382^{NS}	-0.2007^{NS}	0.1383^{NS}	0.1042^{NS}		
Grain yield plant^{-1}	-0.1287^{NS}	-0.1221^{NS}	0.1105^{NS}	0.0185^{NS}	0.8145^{**}	
Seed Index	-0.5085^{**}	-0.0541^{NS}	-0.2560^{NS}	-0.1691^{NS}	0.0242^{NS}	0.0625^{NS}

NS, non-significant; **, $p < 0.01$.

Correlation analysis

Grain yield is the resultant product of different interlinked characters which is not under the direct control of any single gene. Thus, an improvement of component characters leads to a consequent improvement in the yield. Therefore, the understanding of the mechanism of association that is, cause and effect relationship provides the foundation for formulating suitable selection criteria for breeding program on the basis of yield components for achieving rational improvement of yield and its components. The estimates of correlation coefficients was worked out among 7 yield and its associated traits, like plant height, spike length, spikelets spike^{-1}, grains spike^{-1}, tillers plant^{-1}, grain yield plant^{-1} and seed index (Table 3). The correlation coefficient for yield and its contributing traits of wheat genotypes showed a positive and significant ($P < 0.05$) association of plant height and grains spike^{-1} ($r = 0.5541$); spike length v/s spikelets spike^{-1} ($r = 0.5986$), spike length v/s grains spike^{-1} ($r = 0.6667$), spikelets spike^{-1} v/s grains spike^{-1} ($r = 0.5592$) and tillers plant^{-1} v/s grain yield ($r = 0.8145$); while negative and significant ($r = -0.5085$) correlation was found between plant height and seed index. The correlation study indicates that with increasing spike length, the spikelets and grains spike^{-1} were positively influenced, but increasing plant height showed adverse effects on seed index. Increasing tillers plant^{-1} positively and significantly influenced the grain yield plant^{-1}. Fellahi *et al*. (2013) who calculated the genotypic and phenotypic correlations in 29 bread wheat cultivars and concluded spike length and number of tillers plant^{-1} exhibited positive and were highly and significantly correlated with grain yield. Baloch *et al.* (2014) also studied 20 advance bread wheat genotypes and reported that traits like ear head length, spikelets spike^{-1}, grains spike^{-1}, seed index and harvest index established positive and significant correlations with grain yield plant^{-1}.

REFERENCES

Ali, Y., B. M. Atta, J. Akhter, P. Monneveux and Z. Lateef (2009).Genetic variability, association and diversity studies in wheat germplasm (*Triticum aestivum* L.). *Pak. J. Bot.*, 40(5): 2087-2097.

Aycecik, M. and T. Yildirim (2006). Path coefficient analysis of yield and yield components in bread wheat (*Triticum aestivum* L.) genotypes. *Pak. J. Bot.*, 38(2): 417-424.

Baloch, A. W., M. Baloch, I.A. Baloch, S.N. Mari, D.K. Mandan and S.A. Abro (2014). Association and path analysis in advance Pakistani bread wheat genotypes. *Pure Appl. Bio*., 3(3): 115-120.

Baloch, A. W., M. Baloch, M. J. Baloch, R. A. Kandhro, M. N. Kandhro, N. Gandahi, G. M. Bloch, I. A. Baloch, M. Ali and A. M. Baloch (2016). Evaluation of exotic bread wheat genotypes for yield and its associated traits. *Int. J. Bio, Biotech.*, 13 (1): 107-110.

Fellahi, Z., A. Hannachi, H. Bouzerzour and A. Boutekrabt (2013).Correlation between traits and path analysis coefficient for grain yield and other quantitative traits in bread wheat under semiarid conditions. *J. Agri. Sust.*, 3(1): 16-26.

Ferede, M. and F. Worede (2016).Grain yield stability and phenotypic correlation analysis of bread wheat (*Triticum aestivum* L.) genotypes in North Western Ethiopia. *Food Sci. Qual. Manag.*, 48: 51-59.

GOP, (2013). *Wheat: Economic Survey of Pakistan*, 2012-13. Ministry of Food, Agriculture and Livestock, Agriculture & Livestock Division (Economic Wing), Government of Pakistan, Islamabad.

Kara, B. and Z. Akman (2007).Correlation and path coefficient analysis in the local wheat ecotypes. *Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 11(3): 219-224.

Kashif, K., H. Ihsan and M. Khaliq (2007).Heritability, correlation and path coefficient analysis for some metric traits in wheat. *Int. J. Agri. Bio.*, 56(3): 138-142.

Khan, M. H. and A. N. Dar (2009).Correlation and path coefficient analysis of some quantitative traits in wheat. *African Crop Sci. J.*, 18 (1): 9-14.

Shahid, M., M. Fida and M. Tahir (2002). Path coefficient analysis in wheat. *Sarhad J. Agri.*, 18:383-388.

Shewry, P.R. (2009). Wheat research. *Wheat J.Exper. Bot.*, 60:1537-1553.

Turk, M. and N. Celik (2006). Correlation and path coefficient analyses of seed yield components in the Sainfoin (*Onobrychis sativa* L.). *J. Biol. Sci.*, 6(4): 758-762.

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