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AGROMORPHOLOGICAL STUDIES OF LOCAL WHEAT VARIETIES FOR VARIABILITY AND THEIR ASSOCIATION WITH YIELD RELATED TRAITS

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Abstract

Twenty five wheat varieties were evaluated for various morphological and yield related traits. Analysis of variance (ANOVA) showed significant differences among the genotypes for flag leaf area, plant height, peduncle length, number of nodes per plant, Spike length, number of spikelets per spike, awn length, Number of grains per spike, yield per plant and harvest index and non-significant for number of tillers per plant. The genotypes that out performed for specific traits were Khyber-79 (flag leaf area), Local white (plant height), Pari-73 (Spike length), Pirsabak-85(awn length), Potohar-70 (spikelet per spike), SA-42 (grains per spike), Kaghan-93(1000 grains weight), harvest index (Kaghan 93) and yield per plant (Kaghan 93). Genotypes Punjab-88, Punjab-81, Indus-79, Kaghan-93 and Soghat-90 were found moderately resistant to leaf rust. Yield per plant was found to be positively associated with number of grains per spike and harvest index. The variety Kaghan-93 showed best performance for most of the yield related traits and disease resistance and is thus recommended for general cultivation.

Introduction

Wheat is the main staple food of our country's population and occupies a central position in agriculture. Apart from abiotic factors wheat is attacked by a number of diseases like rust that cause great losses to the quality and quantity of the produce (Hussain *et al.*, 2011; Bibi *et al.*, 2012). In Pakistan 60% grain yield losses have been reported on susceptible bread wheat cultivar Pirsabak-85 (Haq *et al.*, 2003). Use of varieties with better yield potential and wide range of adaptability are of prime importance for increasing wheat production. Thus development of high yielding and disease resistant wheat cultivars has always been a major objective of wheat breeding programs throughout the world. Extensive testing of wheat genotypes under varying environments has been practiced for screening relatively stable cultivars (Aggarwal & Sinha, 1984; Shafi *et al.*, 2013). There is a large gape between yield potential of our modern wheat varieties and yield production which indicated that crop yield can be improved through better crop husbandry (Laghari *et al*., 2010). Grain yield is a product of an organized interplay of its several components, which are highly susceptible to environmental fluctuations. Enhancement in yield in most situations is more effectively fulfilled on the basis of performance of yield components, which are closely associated with grain yield (Ashfaq *et al*., 2003; Razzaq *et al.*, 2013). Analysis of variability among the traits and the association of a particular character in relation to other traits contributing to yield of a crop would be of great importance in planning successful breeding programme (Kahrizi *et al.*, 2010). Grain yield plant^{-1} can be improved by selecting genotypes having more number of spikelets spike^{-1}, number of grains spike^{-1} and grains weight per spike (Inamullah *et al*., 2006). High yielding population may be selected by concentrating upon the flag leaf area, number of tillers per plant, spike length, number of spikelets per spike and 1000-grain weight (Ashfaq *et al.*, 2003; Saleem *et al.*, 2006). The present research was therefore conducted to determine variations between wheat genotypes using morphological characters and leaf rust resistance following the method of Goel & Saini (2001) under field conditions of Mansehra.

Materials and Methods

Morphological and yield associated study was carried out over twenty five wheat varieties viz., Zamindar-80, Nuri-70, Potohar-70, Punjab-88, SA-42, Bakhtawar-94, ZA-77, C-518, Chenab-70, Faisalabad-83, Punjab-81, Dirk, Sonalika, Maxipak, BWP-94, Khyber-79, Pari-73, Indus-79, Potohar-93, SA-75, Kaghan-93, Rohtas-90, Local white, Pirsabak-85 and Soghat-90. These varieties were planted in a randomized complete block design with three replications at the Department of Genetics, Hazara University Mansehra. Each replicate consisted of twenty five rows with a row length of 1.5 meter and row to row space of 30 cm. At appropriate stage of growth five plants were randomly selected from each row of each plot and data were collected for variation in qualitative and quantitative traits including flag leaf area, plant height, peduncle length, tillers per plant, number of nodes per plant, percent leaf area covered by rust, Spike length, number of spikelets per spike, awn length, number of grains per spike, 1000-grain weight, yield per plant and harvest index. Leaf rust severity was estimated visually as the percentage of leaf area affected using the slightly modified integrated scale (1-9) for rust evaluation (Goel & Saini, 2001) and the international unified leaf rust scale (Johnston & Browder 1964) as shown in Table 1. The data were statistically analyzed by using the statistical package (MSTATC, Version 2.00) and Least Significant difference (LSD) test was applied to separate the means and correlation coefficient (r) determined for association analysis.

Table 1. Rust rating scale

S. No.	Rust percentage (%)	Rating	Resistance category
1.	0	9	Very highly resistant (VHR)
2.	0-5	8	Highly resistant (HR)
3.	5-10	7	Resistant (R)
4.	10-15	6	Moderately resistant (MR)
5.	15-25	5	Moderately susceptible (MS)
6.	25-40	4	Moderately susceptible to susceptible (MSS)
7.	40-70	3	Susceptible (S)
8.	70-90	2	Highly susceptible (HS)
9.	90-100	1	Very highly susceptible (VHS)

Table 2. Analysis of variance for the studied traits.

Traits	Means squares			
	Replication	Genotypes	Error	P Value
Flag leaf area	88.505	140.107**	34.339	0.000
Plant height	365.404	125.264*	63.990	0.029
Peduncle length	77.326	17.942*	9.974	0.034
Tillers per plant	7.712	1.270NS	2.249	
Nodes per tillers	0.052	0.166**	0.016	0.000
Length of spike	4.876	1.675**	0.737	0.000
Length of awn	0.851	8.658**	1.915	0.000
Number of spikelet's/spike	15.381	4.785**	1.932	0.000
number of grains per spike	367.515	117.289**	45.636	0.000
harvest index	20.130	40.673**	3.681	0.000
1000-grains weight	105.76	45.397**	12.379	0.000
yield per plant	1.867	3.402**	0.444	0.000
Rust resistance	0.653	1.036**	0.376	0.000

NS= Non-significant,*= Significant at 0.05 level of significance, **= Significant at 0.01 level of significance

Results

Results obtained on various traits of twenty five wheat genotypes grown under field conditions of Mansehra during the present investigation, are briefly discussed under.

Flag leaf area: Flag leaf area is an important yield contributing trait. Analysis of variance showed that genotypes were highly significant for flag leaf area (Table 2). Maximum flag leaf area was recorded for the genotype Khyber-79 (57.17 cm^2), followed by Indus-79, ZA-77 and Pari-73, while minimum flag leaf area recorded for Nuri-70 (Table 3a). Flag leaf area showed positive but non significant correlation with plant height, spike length and yield/plant (Table 4).

Plant height: Statistical analysis of all wheat genotypes showed highly significant differences for plant height (Table 2). Among the tested genotypes Local white produced highest plant height (99.11cm) followed by Dirk, Potohar-70 and Pari-73 (Table 3a). The lowest plant height recorded for wheat genotype Zamindar-80 (73.24cm). Correlation studies (Table 4) showed that plant height had positive and significant correlation with 1000 grains weight.

Peduncle length: Analysis of variance (Table 2) revealed significant results for peduncle length. Table of means (Table 3a) revealed that the length of peduncle of genotype Khyber-79 (52.55cm) was largest among the tested genotype followed by Kaghan-93, Local white and Nuri-70 and the smallest peduncle length was observed for Bakhtawar-94 (27.11cm)**.** Peduncle length had significant positive correlation with harvest index and negative but non significant correlation with nodes per plant, awn length, tillers per plant and resistance against rust diseases. Peduncle length had non significant positive correlation with spike length, number of spikelets per spike, number of grains per spike, yield per plant and 1000 grains weight.

Number of tillers per plant: Statistical analysis (Table 2) showed that number of tillers per pant was non-significant among the tested genotypes. Table of means (Table 3a) revealed that genotype Faisalabad-83 had maximum number of tillers per plant (6.77) while the genotypes Rohtas-90 and Kaghan-93 (4.33) had minimum number of tillers per plant among the tested genotypes. Correlation studies (Table 4) for number of tillers per plant showed that it had non-significant positive correlation with number of nodes per plant and flag leaf area and negative non-significant correlation with the rest of the studied traits.

Table 3a. Means of twenty five local wheat varieties for flag leaf area, plant height, peduncle length, tillers per plant, nodes per plant, spike length and awn length.

S. No	Genotypes	Parameters						
		Flag leaf area	Plant height	Peduncle length	Tillers per plant	Nodes per plant	Spike length	Awn length
1.	Zamindar-80	41.35CDEFGH	73.24F	27.83FG	5.77A	4.11DE	9.607CD	6.92BC
2.	Nuri-70	29.96J	84.54BCDEF	34.50CD	5.21A	4.44B	9.830BCD	7.33BC
3.	Potohar-70	34.71GHIJ	92.11ABC	30.05DEFG	5.22A	4.99A	10.82ABC	3.57E
4.	Punjab-88	38.11DEFGHIJ	78.44DEF	30.11DEFG	6.22A	4.22CD	10.11BCD	6.04BCD
5.	SA-42	31.69IJ	76.16DEF	28.78EFG	6.55A	4.07DEF	9.997BCD	5.06CDE
6.	Bakhtawar-94	32.52GHIJ	73.61EF	27.11G	4.55A	3.99EF	9.720CD	5.13BCDE
7.	ZA-77	50.72ABC	83.44DCDEF	29.44DEFG	6.10A	4.07DEF	9.330D	6.25BCD
8.	C-518	35.83FGHIJ	78.22DEF	27.88FG	5.32A	4.11DE	9.550CD	7.38B
9.	Chenab-70	39.69DEFGHI	87.72DEF	29.94DEFG	5.99A	3.77G	9.273D	5.91BCD
10.	Faisalabad-83	39.40DEFGHIJ	81.16CDEF	30.22DEFG	6.77A	4.22CD	10.88ABC	6.05BCD
11.	Punjab-81	47.19BCDE	84.77BCDEF	30.70DEFG	6.21A	4.44B	9.887BCD	6.70BCD
12.	Dirk	41.54CDEFGH	95.55AB	32.16CDEFG	5.99A	4.32BC	9.830BCD	0.0F
13.	Sonalika	39.40DEFGHIJ	87.78ABCD	32.61CDEF	5.21A	4.07DEF	9.887BCD	5.87BCD
14.	Maxi-Pak	37.62EFGHIJ	85.66BCDEF	32.55CDEF	5.21A	4.18CDE	10.05BCD	6.51BCD
15.	BWP-94	41.36CDEFGH	83.39BCDEF	33.72CDE	5.44A	4.21CD	10.22BCD	5.87BCD
16.	Khyber-79	57.17A	85.44BCDEF	52.55A	6.00A	3.88FG	10.55ABCD	6.61BCD
17.	Pari-73	47.52BCD	88.11ABCD	31.00DEFG	5.66A	4.07DEF	11.72A	6.83BC
18.	Indus-79	53.57AB	83.72BCDEF	30.05DEFG	5.10A	3.99EF	11.67A	6.61BCD
19.	Potohar-93	41.29CDEFGHI	83.27BCDEF	32.83CDEF	6.44A	4.11DE	11.16AB	5.83BCDE
20.	SA-75	34.92GHIJ	80.44CDEF	29.11EFG	5.99A	4.22CD	10.39ABCD	6.50BCD
21.	Kaghan-93	36.07FGHIJ	86.49ABCDE	45.94B	4.33A	4.10DE	10.88ABC	6.48BCD
22.	Rohtas-90	31.93HIJ	74.33EF	29.77DEFG	4.33A	4.22CD	10.62ABCD	6.37BCD
23.	Local white	41.61CDEFG	99.11A	36.88C	5.33A	3.99EF	9.22D	4.44DE
24.	Pirsabak-85	44.98BCDEF	87.55ABCD	31.22DEFG	5.22A	4.44B	10.50ABCD	9.97A
25.	Soghat-90	40.63DEFGHI	77.89DEF	29.06EFG	5.44A	3.99EF	10.77ABC	5.87BCD
LSD value		**9.620**	**13.13**	**5.185**	**2.464**	**0.1872**	**1.409**	**2.272**

Number of nodes per plant: Number of nodes were found significantly varied among the tested genotypes (Table 2). The maximum number of nodes per plant was observed in Potohar-70 (4.99) followed by Nuri-70 and Punjab-81(Table 3a) while Chenab-70 (3.77) had minimum number of nodes per Plant. Number of nodes per plant had significant positive correlation with number of spikelets per spike and non significant positive correlation with spike length, and 1000 grains weight. While non significant negative correlation was found with awn length, number of grains per spike, yield per plant, harvest index and resistance against leaf rust disease.

Length of spike: The spike length was highly significant among the tested genotypes (Table 2). The maximum length of spike was observed in Pari-73 (11.72cm) among the tested genotypes followed by Indus-79, potohar-93 and Faisalabad-83 (Table 3b). And the minimum value for spike length was observed for Local white (9.22cm). Spike length has positive but non significant correlation with all the traits except 1000 grains weight and tillers per plant which has negative but non-significant correlation.

Awn length: Analysis of variance for awn length was found significant (Table 2). Maximum awn length was exhibited by Pirsabak-85 followed by C-518 and Nuri-70 while the genotype Dirk was found to be awnless. Awn length has non significant positive correlation with yield/plant, number of spikelets/spike, and number of grains/spike while non significant negative correlation was found with harvest index, 1000 grains weight and number of tillers/plant.

Number of spikelets per spike: The analysis of variance (Table 2) showed that the number of spikelets per spike was highly significant among the tested genotypes**.** Table of means (Table 3b) showed that maximum number of spikelets per spike was produced by genotype Potohar-70 (22.11) followed by Indus-79, Potohar-93 and Faisalabad-83 while the minimum number of spikelets per spike was found in genotype Local white and Dirk (16.44) in comparison to other tested genotypes. In case of correlation studies (Table 4) number of spikelets/spike was found to have significant positive correlation with number of node per plant, while it has positive but non significant correlation with flag leaf area, peduncle length, spike length, awn length, number of grains per spikes, 1000 grains weight, harvest index and yield per plant.

Table 3b. Means of twenty five local wheat varieties for yield related traits.

S.No.	Genotypes	Parameters						
		Spikelet's per spike	Grains per spike	Yield per plant	Harvest index	1000 grains weight	Rust resistance	Resistance category
1.	Zamindar-80	18.33^{BCDE}	28.62^{F}	4.25^{HIJK}	29.64^{H}	40.67^{ABCD}	4.667^{ABCD}	MS
2.	Nuri-70	19.00^{BCD}	32^{DEF}	3.25^{K}	33.37^{G}	32.88^{EFGHI}	3.667^{D}	MSS
3.	Potohar-70	22.11^{A}	37.11^{BCDEF}	5.29^{CDEFGH}	36.14^{BCDEFG}	37.68^{BCDEF}	4.333^{BCD}	MS
4.	Punjab-88	17.89^{CDE}	39.78^{BCDE}	5.95^{CDE}	36.89^{BCDE}	32.37^{FGHI}	5.667^{A}	MR
5.	SA-42	19.00^{BCD}	51.22^{A}	5.73^{CDEFG}	38.08^{BC}	32.04^{FGHI}	5^{ABC}	MS
6.	Bakhtawar94	17.66^{CDE}	46.22^{AB}	6.07^{CDE}	36.44^{BCDEFG}	33.54^{EFGHI}	4.667^{ABCD}	MS
7.	ZA-77	17.66^{CDE}	38.55^{BCDEF}	5.37^{CDEFG}	35.78^{BCDEFG}	33.33^{EFGHI}	4.333^{BCD}	MS
8.	C-518	17.55^{CDE}	34.88^{CDEF}	5.57^{CDEFG}	37.90^{BCD}	37.06^{CDEFG}	4.667^{ABCD}	MS
9.	Chenab-70	17.11^{DE}	31.11^{EF}	3.99^{IJK}	34.52^{EFG}	34.94^{DEFGH}	4.667^{ABCD}	MS
10.	Faisalabad-83	18.11^{CDE}	37.11^{BCDEF}	5.51^{CDEFG}	36.08^{BCDEFG}	29.16^{I}	4^{CD}	MSS
11.	Punjab-81	19.77^{BC}	35.22^{BCDEF}	5.10^{EFGH}	45.94^{A}	36.37^{DEFGH}	5.333^{AB}	MR
12.	Dirk	16.44^{E}	28.11^{F}	3.77^{JK}	35.95^{BCDEFG}	43.46^{AB}	4^{CD}	MSS
13.	Sonalika	17.55^{CDE}	28.22^{F}	4.64^{GHIJ}	36.75^{BCDEF}	37.11^{CDEFG}	4.667^{ABCD}	MS
14.	Maxi-Pak	17.66^{CDE}	46.11^{AB}	5.86^{CDE}	33.69^{FG}	31.69^{GHI}	4^{CD}	MSS
15.	BWP-94	18.99^{BCD}	41.11^{ABCDE}	5.74^{CDEF}	36.95^{BCDE}	35.90^{DEFGH}	5^{ABC}	MS
16.	Khyber-79	19.66^{BC}	43.00^{ABCD}	5.04^{EFGHI}	35.34^{CDEFG}	33.45^{EFGHI}	4^{CD}	MSS
17.	Pari-73	18.33^{BCDE}	37.88^{BCDEF}	5.46^{CDEFG}	34.90^{DEFG}	32.45^{FGHI}	4^{CD}	MSS
18.	Indus-79	20.55^{AB}	45.44^{ABC}	6.32^{BC}	38.62^{B}	34.43^{EFGHI}	5.333^{AB}	MR
19.	Potohar-93	18.55^{BCDE}	43.00^{ABCD}	7.36^{AB}	37.49^{BCDE}	35.28^{DEFGH}	4^{CD}	MSS
20.	SA-75	18.89^{BCD}	37.44^{BCDEF}	3.92^{JK}	35.73^{BCDEFG}	33.12^{EFGHI}	4.667^{ABCD}	MS
21.	Kaghan-93	18.55^{BCDE}	44.33^{ABC}	7.89^{A}	45.46^{A}	43.79^{A}	5.333^{AB}	MR
22.	Rohtas-90	19.22^{BCD}	45.22^{ABC}	4.76^{BCD}	37.14^{BCDE}	30.61^{HI}	4.667^{ABCD}	MS
23.	Local white	16.44^{E}	37.88^{BCDEF}	6.25^{CD}	35.84^{BCDEFG}	38.48^{ABCDE}	3.667^{D}	MSS
24.	Pirsabak-85	19.44^{BC}	32.33^{DEF}	4.69^{FGHIJ}	29.03^{H}	42.19^{ABC}	4.667^{ABCD}	MS
25.	Soghat-90	17.55^{CDE}	35.66^{BCDEF}	$5.18D^{EFGH}$	36.30^{BCDEFG}	37.45^{CDEFG}	5.667^{A}	MR
LSD values		**2.282**	**11.09**	**1.098**	**3.150**	**5.776**	**1.007**	

Number of grains per spike: Analysis of Variance (Table 2) for number of grains per spike showed that number of grains per spike were significant at 5% level of significance. Maximum number of grains per spike was observed for SA-42, followed by Bakhtawar-94, Maxipak and Indus-79 and the minimum number of grains per spike was found in genotype Dirk (28.11) among the tested genotypes (Table 3b). Correlation studies (Table 4) Showed that the number of grains/spike had highly significant positive correlation with yield per plant. Number of grains/spike was found to have significant negative correlation with 1000 grains weight. Non significant positive correlation was observed with harvest index. While non significant negative correlation was observed with number of tillers/plant.

Harvest index: Harvest index was found to be significant at 5% level of significance (Table 2). Highest mean value for harvest index was exhibited by Punjab-81(45.94) among the tested genotypes followed by Kaghan-93, Indus-79, SA-42 and C-518, while the lowest mean value for harvest index was found in genotype Pirsabak 85 (Table 3b). Harvest index had non significant negative correlation with 1000 grains weight and number of tillers per plant.

1000-grains weight: Analysis of variance for 1000-grains weight was found significant (Table 2). 1000 grains weight of Kaghan-93 (43.79) was highest among the tested genotypes followed by Dirk, Pirsabak-85 and Zamindar-80 (Table 3b). While the lowest mean value for 1000-grains weight was found in genotype Faisalabad-83 (29.16g). 1000 grains weight had non significant negative correlation with the number of tillers/plant.

Yield per plant: Analysis of variance for yield per plant showed that yield per plant was significant at 5 % level of significance (Table 2). Highest yield per plant showed by genotype Kaghan-93 (7.98g) followed by Potohar-93 and Indus-79 while the lowest yield was found in Nuri-70 (Table 3b). Number of grains per spike and harvest index was found to have significant positive correlation with yield per plant (Table 4). Yield per plant showed non significant positive correlation with flag leaf area, plant height, peduncle length, spike length, awn length, spikelets per spike, while negative correlation of yield per plant was found with number of tillers per plant.

Rust resistance: Analysis of variance (Table 2) for rust resistance was found significant. Table of means (Table 3b) showed that genotypes Punjab-88, Punjab-81, Indus 79, Kaghan-93 and Soghat-90 were found moderately resistant (MR) to leaf rust severity while the remaining genotypes were found to be moderately susceptible (MS) and moderately susceptible to susceptible (MSS). The genotypes resistance against rust had significant negative correlation with plant height and peduncle length and non significant negative correlation with number of tillers/plant. While 1000 grains weight has non significant and positive correlation with resistance against rust.

Table 4. Simple correlation among yield and yield related traits of 25 wheat varieties.

Traits	Plant height (cm)	Peduncle length (cm)	Nodes per plant	Spike length (cm)	Awn length (cm)	Spikelets per spike	Number of grains per spike	Yield per plant	Harvest index	1000 Grains weight (g)	Tillers per plant	Rust resistance
Flag leaf area (cm^2)	0.163^{NS}	0.146^{NS}	-0.228^{NS}	0.381^{NS}	0.146^{NS}	0.114^{NS}	-0.196^{NS}	0.099^{NS}	0.006^{NS}	0.089^{NS}	0.274^{NS}	-0.013^{NS}
Plant height	-	0.394^{*}	0.324^{NS}	0.055^{NS}	-0.370^{NS}	-0.022^{NS}	-0.255^{NS}	0.052^{NS}	0.510^{**}	0.415^{*}	-0.028	-0.462^{*}
Peduncle length	-	-	-0.195^{NS}	0.149^{NS}	-0.109^{NS}	0.086^{NS}	0.174^{NS}	0.245^{NS}	0.386^{*}	0.273^{NS}	-0.128^{NS}	-0.498^{**}
Nodes per plant	-	-	-	0.133^{NS}	-0.127^{NS}	0.570^{*}	-0.190^{NS}	-0.187^{NS}	-0.201^{NS}	0.154^{NS}	0.089^{NS}	-0.109^{NS}
Spike length	-	-	-	-	0.158^{NS}	0.531^{NS}	0.341^{NS}	0.364^{NS}	0.191^{NS}	-0.164^{NS}	-0.074^{NS}	0.285^{NS}
Awn length	-	-	-	-	-	0.250^{NS}	0.059^{NS}	0.042^{NS}	-0.177^{NS}	-0.182^{NS}	-0.143^{NS}	0.205^{NS}
Spikelets per spike	-	-	-	-	-	-	0.270^{NS}	0.051^{NS}	0.125^{NS}	0.033^{NS}	-0.113^{NS}	0.175^{NS}
No. grains per spike	-	-	-	-	-	-	-	0.655^{**}	0.242^{NS}	-0.461^{*}	-0.187^{NS}	0.161^{NS}
Yield per plant	-	-	-	-	-	-	-	-	0.494^{**}	0.034^{NS}	-0.149^{NS}	0.227^{NS}
Harvest index	-	-	-	-	-	-	-	-	-	-0.027^{NS}	-0.019^{NS}	0.082^{NS}
1000 G. W	-	-	-	-	-	-	-	-	-	-	-0.269^{NS}	0.146^{NS}
Tillers per plant	-	-	-	-	-	-	-	-	-	-	-	-0.122^{NS}

^{NS}= Non-significant, *= Significant at 0.05 level of significance, **= Significant at 0.01 level of significance

Discussion

Successful breeding of new and high yielding varieties depends on the yield contributing morphological traits and choosing small number of important traits having positive correlation. Flag leaf area, plant height, peduncle length and number of tillers per plant are an important morphological yield contributing traits and positively correlated with yield per plant (Inamullah *et al*., 2006; Khaliq *et al*., 2008). Traits such as number of grains per spike, spike length, number of spikelets per spike, 1000 grain weight and harvest index contribute towards final grains yield (Kazi *et al.,* 2012; Abbas *et al.,* 2013). Grain yield is a product of an organized interplay of its several components, which are highly susceptible to environmental fluctuations. However, yield can be estimated and could be increased on the basis of performance of yield components, which contribute to grain yield (Ashfaq *et al.,* 2003). Analysis of variance among various traits and the association of a particular trait to other traits contributing to yield of a crop are important for the establishment of successful breeding program (Kahrizi *et al.,* 2010). Grains yield can be improved by selecting high yielding wheat varieties for cultivation. High yielding wheat varieties can be selected on the basis of number of spikelets per spike, grains weight per spike, number of grains per spike, flag leaf area, number of tillers per plant, spike length, 1000 grains weight and harvest index (Saleem *et al.,* 2006; Kazi *et al.,* 2012). Yield per unit area can be increased through selecting wheat varieties having good combination of all yield components (Sarwar & Ahmad, 2003; Shami *et al.,* 2010). This selection procedure will ensure a successful hybridization programs. The objective of plant breeding is the development of cultivars combining high and stable productivity with good quality (Fasoulas, 2008 and Laghari *et al*., 2010). A great success of developing high yielding wheat genotypes has been achieved through breeding. Improvement of grain quality is also a major objective of most breeding program. Recently scientist associated the progress in plant breeding with the presence of diverse source material with new germplasm, including such created by breeders (Mangova & Rachovska, 2004; Mollasadeghi *et al.,* 2011).

The present results suggested that high yielding varieties may be selected by concentrating upon the number of grains spike per spike, 1000 grains weight, harvest index, yield per plant and resistance against rust. The variety Kaghan 93 showed best performance for most of the yield related traits and disease resistance and is thus recommended for general cultivation.

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