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Comparison of Six Different Wheat Genotypes (*Triticum* Spp.) And Effectiveness of Some Growing Characters and Yield under Sulaimania Conditions

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Abstract: To study the comparison between morphological characters and yield of wheat plant an experiment was carried out at the Research Field of Agricultural Technical Institute of Bakrajo, affiliates to the Sulaimania Polytechnic University-during two conseuctive seasons 2013 and 2014. Experiment was conducted in a randomized complete blocks design (RCBD) in three replications. Results of analysis of variance showed that there was significant difference between wheat genotypes in the all traits (plant height, spike length, number of spikes, 1000 grains weight and grain yield). This indicated effect these genotypes for improving morphological traits and increasing yield. The results of mean comparing of traits are shown between some genotypes significant difference exists and the results shown clearly the yield of D1 was higher than all other genotypes. Correlation analysis for traits in (2013-2014) showed that grains yield was in the strongest relation with 1000 grains weight (r = 0.632) and studied in 2014-2015 years showed that grain yield was in the strongest relation with 1000 grain weight (r = 0.652).

Key words: Comparison · Yield · Genotypes · *Triticum aestivum* · *Triticum durum*

INTRODUCTION

Kurdistan Region (KR) is rich in agriculture; soil and water are available to help make Kurdistan the richest agricultural areas especially wheat in the Middle East and the world as well. The main problem in the agricultural sector is lack of interest in agricultural research. For these reasons the work in the agricultural research sector considered a sacred duty and honor for me to do it [1,2].Wheat is generally divided into two main types either spring wheat or winter wheat. Within these groups, namely wheat and increase can be defined as either of hard or soft, depending on the grain texture. Grain of wheat colors are white or red [3,4]. What is ubiquitous in our community in the food culture of Iraq especially in the north of Iraq (Kurdistan Region).Wheat is the most important types of crops in Kurdistan, Kurdistan usually consists of wheat, barley, chickpea and lentil cultivation as a rain fed. The wheat crop is one of the main crops cultivated in a very vast area. The majority of agriculture's use their production of wheat of bread factory [1,5] as well as other regions around the world. Bread, pasta, bagels, crackers, cakes and muffins just begin to describe the list of foods made with this grain [6]. Wheat is the world's most important and most widely grown cereal crop through many properties and uses of its grains and straw. Increasing grain yield of wheat is an important national goal to face the contentious increasing food needs of Iraqi population [7]. Two classes of wheat, common and Durum are the major crops. Common wheat is the most prevalent, particularly in the higher rainfall areas. Durum wheat occupies a large area, but is primarily grown where rainfall is more limited (35 to 550 mm) [8]. Facultative and winter wheat are more often grown in the highland zones, being planted in the end of October or in the middle of November and harvested in the end of June in areas where the temperatures are high or the middle of Jun in areas where the temperatures moderate [9-11].

MATERIALS AND METHODS

The experiment run through several stages from the beginning of the planting and even analyzed. The experiment was carried out at the Research Field of Bakrajo Agricultural Technical Institute, affiliate to the Sulaimania Polytechnic University (SPU).

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Table 1: Physical and Chemical Soil Analysis

Properties	EC(dS/m)	pH	%N	Available P (ppm)	Soluble Na_ meq/L	Soluble K_meq/L	Soluble Ca_ meq/L	%Sand	%Silt	%Clay
Sample 1	0.31	7.13	0.24	28.8	0.228	0.369	11.74	12.17	45.72	42.11
Sample 2	0.32	7.19	0.31	27.2	0.233	0.400	11.63	14.54	41.23	44.23

Soil analyzed by: _ Bakrajo Agricultural Research Center –Sulaimania

Experiment was conducted during the two conseuctive seasons (2013-2014) and (2014-2015). The study site is located at an elevation of 847 m above the sea level [1]. The soil of Bakrajo Agricultural Technical Institute belongs to (Clay Loam). Soil physical and chemical analyses are shown in Table 1. After the preparation of the soil were Wheat planted on the lines, The distance between lines was 15 cm, the panels area was 2*3 m (6 m^2), the seeds sown in the autumn season in both years. The temperature during the cropping period ranged between 0°C to 38°C [12]. We relied in agriculture on the rain only, without the use of any supplementary irrigation, there rainfall during the experimental was 623.4 mm in 2013 and 659.8 mm in 2014. The purpose of the experiment is a comparison of six genotypes of Wheat (Aras, Adana, D31, Rash gull, Sardary and Adelsede), the first three genotypes consisting of *Triticum aestivum* L. and other three genotypes consisting *Triticum durum* L. all the seeds of genotypes were collected from Bakrajo Agricultural Research Center (BARC)-Experiment was laid out in randomized complete block design (RCBD) with three replications for each verity of Wheat. Experiment was carried out under the same conditions in the two seasons such as the soil preparation, plowing hoeing, weeding, weeds control by herbicides and the proportion of rainfall fairly close in two seasons. Agronomic characteristics were including plant height, number of spikes per plant, number of seeds per spike, 1000 grains weight [13]. Data were recorded on 5 competitive plants of each plot and grain yield (kg /ha) was calculated for the entire plot. Data analysis was done by using SPSS for analysis of variance and compare means by Duncan and correlation coefficient analysis.

RESULTS AND DISCUSSION

Analysis of Variance: Results of analysis of variance (Table 2 and 3) showed that there was significant difference between wheat genotypes in the all traits. This indicated effect these genotypes for improving morphological traits. The data showed that all growth parameters were increased gradually by using these genotypes [13]. The data showed high potential of these genotypes for improving wheat yields. Results in 2013 indicated that in studied genotypes, plant height number of spikes per plant, 1000 grains weight and yield per hectare was significant at 1% probability and number of seed per spike at 5% probability (Table 2), while in 2014 showed that characters such spike length, number of spikes per plant and yield per hectare was significant at 1% probability and plant height, number of seeds per spike and 1000 grains weight at 5% probability (Table 3).

Compare Means: The results of mean comparing of traits are shown in (Table 4-6) between majority genotypes significant difference exists.

Plant Hieght: Data presented in Tables 4-6 showed the means of the final plant height. The means of the Rash gull was higher than all of other genotypes while. The minimum plant height was obtained with Adeelsade genotypes. The mean difference is statistically significant in the case of wheat genotypes treatment, compared to in all other genotypes (Table 4-6).

Spike Length: Data in Tables 4-6 showed the mean of the final spike length. The means of the Araz cultivar was higher than of all other genotypes. The mean of Araz was higher than Sardary, while the minimum spike length was obtained by Rash gull genotype (Tables 4 and 6) while data in Table 5 showed mean of Araz was higher than D31 and the minimum spike length with Rash gull genotype. The mean difference is statistically significant in the case of wheat genotypes treatment, compared to all other genotypes (Table 4-6).

Number of Spikes per Plant: The results in Table 4-6) showed the mean of the final number of spikes per plant. The means of the Araz was higher than that of all other genotypes. The mean of Araz was higher than D31, while the minimum number of spikes per plant was obtained with Rash gull genotype (Tables 4 and 6). The Dat in Table 5 showed mean of Adeelsade was higher than Araz, while the minimum number of spikes per plant was obtained by D31 genotype. The mean difference is statistically significant in the case of wheat genotypes treatment, compared to all other genotypes (Tables 4-6).

Table 2: Analysis of variance (RCBD) for studied traits in 2013-2014

		MS					
S.O.V	df	Plant height cm	Spike length cm	Number of spikes / plant	Number of seeds / spike	1000 grains weight/(g)	Grain yield kg/ha
Replication	2	6.524	.084	.785*	0.389	0.292	18397.78**
Treatment	5	806.16**	4.34**	7.58**	15.78*	40.66**	379086.13**
Error	10	26.259	0.163	0.114	3.522	1.955	745.102

Table 3: Analysis of variance (RCBD) for studied traits in 2014-2015

		MS					
S.O.V	df	Plant height cm	Spike lengthcm	Number of spikes / plant	Number of seeds / spike	1000 grains weight/(g)	Grain yield kg/ha
Replication	2	42.53	0.471	.261	1.16	8.88	1100.08
Treatment	5	68.56*	1.84**	1.27**	19.03*	15.55*	366875.59**
Error	10	15.19	0.268	0.153	4.3	2.84	3804.02

Table 4: Mean comparing in wheat genotypes in 2013-2014

Traits						
Genotypes	Plant height cm	Spike length cm	Number of spikes / plant	Number of grains / spike	1000 grains weight/(g)	Grain yield kg/ha
Araz	101.86d	9.8c	8.9e	39.2b	37.7b	1708.4c
D31	88.26bc	9.16c	7d	39b	33.9a	2063.36e
Addana	95.13cd	9.06c	6.4cd	33.66a	39.36b	1937.63d
Sardary	85.56b	9.4c	5.76bc	35a	34.5a	1319.06b
Rash gull	114.4e	6.5a	4.5a	38.66b	44.03c	1941.13d
Adeelsade	65.93a	8.1b	4.93ab	36.33a	41.6b	1203.2a

Table 5: Mean comparing in wheat genotypes in 2014-2015

Traits						
Genotypes	Plant height cm	Spike lengthcm	Number of spikes / plant	Number of grains / spike	1000 grains weight/(g)	Grain yield kg/ha
Araz	93.66c	10.13e	7.43bc	41.33c	36.7b	1661.8c
D31	99.8d	9.46de	5.8a	37.33ab	33.03a	1990.03e
Addana	90bc	8.6c	6.6ab	36.33ab	40.13c	1891.56d
Sardary	86.9b	9.33cd	7.26bc	34.33a	34.16a	1258.66b
Rash gull	111.06e	6.43a	7.13bc	37.66ab	43.53d	1857.46d
Adeelsade	69.63a	7.83b	8.06c	40bc	37.46b	1122a

Table 6: Mean comparing in wheat genotypes between 2013-2014 and 2014-2015

Traits						
Genotypes	Plant height cm	Spike length cm	Number of spikes plant	Number of grains spike	1000 grains weight/(g)	Grain yield kg/ha
Araz	97.76c	9.96e	8.16c	40.33b	37.2b	1685.1b
D31	94.03c	9.31d	6.6ab	38.16b	33.81a	2026.85d
Addana	92.56c	8.83c	6.5b	35a	39.75b	1914.6c
Sardary	86.23b	9.36d	6.51b	34.66a	34.33a	1221.53a
Rash goll	112.73d	6.46a	5.8a	38.25b	43.78c	1899.3c
Adeelsade	67.78a	7.96b	6.5b	38.16b	37.33b	1162.6a

Table 7: Correlation coefficient of studied traits in Wheat genotypes 2013-2014

Traits	Plant height/ cm	Spike length/ cm	Number of spikes / plant	Number of grains / spike	1000 grains weight/ (g)	Grain yield kg/ha
Plant height (cm)	1					
Spike length (cm)	-0.208	1				
Number of spikes / plant	-0.452	-0.177	1			
Number of grains / spike	-0.129	0.105	0.311	1		
1000 grains weight (g)	0.517*	-0.763**	0.247	0.098	1	
Grain yield (kg/ha)	0.467	0.016	0.595*	0.634**	0.652**	1

Table 8: Correlation coefficient of studied traits in Wheat genotypes 2014-2015

Traits Name	Plant height/ cm	Spike length/ cm	Number of spikes / plant	Number of grains / spike	1000 grains weight/ (g)	Grain yield kg/ha
Plant height(cm)	1					
Spike length(cm)	-0.262	1				
Number of spikes / plant	0.158	.0731**	1			
Number of grains/ spike	0.335	-0.166	0.269	1		
1000 grains weight/ (g)	0.657**	-0.697**	-0.335	0.132	1	
Grain yield (kg/ha)	0.470	-0.092	0.525*	0.608**	.632**	1

Number of Grains per Spike: The results in Tables 4-6 showed the mean of the final number of grains per spike. The means of the Rash gull was higher than that of all other genotypes. The mean of rash gull was higher than Araz,while the minimum number of grains per spike was produced by Addana genotype (Table 4), whereas the mean of Araz was higher than Addana and the minimum number of grains per spike was produced by Sardary genotype (Table 5). Table 6 show mean of Araz was higher than Rrash gull and the minimum number of grains per spike was produced by Sardary genotype. The mean difference is statistically significant in the case of wheat genotypes treatment, compared to all other genotypes (Table 4-6).

1000 Grains Weight: Table (4-6) show the mean of the final 1000 grains weight. The means of the Rash gull was higher than that of all other genotypes. The mean of Rash gull was higher than Adeelsade and the minimum 1000 grains weight was recorded by D31genotype (Table 4). Tables 5 and 6 show mean of Rash gull was higher than Addana and the minimum 1000 grains weight was recorded by D31genotype. The mean difference is statistically significant in the case of wheat genotypes treatment, compared to all other genotypes (Table 4-6).

Grain Yield: Data presented in Table 4-6 showed the mean of the final grain yield. The means of the D31 was higher than of all other genotypes. The mean of D31 was higher than Rash gull and the minimum grain yield was produced by Adeelsade genotype (Table 4).Tables 5 and 6 show the mean value of D31 was higher than Addana and the minimum grain yield was produced by Adeelsade genotype. The mean difference is statistically significant in the case of wheat genotypes treatment, compared to all other genotypes (Table 4-6).

Correlation Analysis: To determine association between studied traits we calculated coefficient of correlation. Studied in 2013-2014 years showed (Table 7) that grain yield was the strongest relation with 1000 grains weight (r = 0.632). After this traits the number of grains per spike (r = 0.608) and number of spikes per plant (r = 0.525) showed the most correlation with grain yield (Table 7). Increasing number of grains per spike and number of spikes per plant caused increase majority traits according highest correlation this trait with other traits [14]. The highest positive correlation were observed between number of spikes per plant and spike length (r = 0.731), plant height and 1000 grains weight (r = 0.657). However, negative correlation was also found among certain characters in the present study [15,16].Studied in 2014-2015 years showed (Table 8) that grain yield was the strongest relation with 1000 grains weight (r = 0.652). After this traits the number of grains per spike (r = 0.634) and number of spikes per plant (r = 0.595) showed the most correlation with grain yield (Table 8).The highest positive were observed between spike length and 1000_ grains weight (r = 0.517). [17, 18].

CONCLUSION

The traits 1000 grains weight, number of spikes per plant and number of grains per spike were positively correlated and could be used for the selection of better yielding lines under Kurdistan region. The results compare means showed between genotypes and the minimum grain yield was recorded with the Sardary genotype while the maximum was recorded by D31genotype. It could be concluded that the 1000 grains weight, number of spikes per plant and number of grains per spike are the characters which contribute largely grain yield of wheat seedlings and selection can be made on the basis of these characters [19, 20].

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