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Estimation of some genetic parameters and correlation in the varieties of bread wheat under the conditions of Al Diwaniyah

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Key words: Varieties, Wheat, Genetic parameters, Expected genetic improvement, Genetic link.

Abstract

A field experiment was carried out in the fields of one of the farmers in AL Diwaniyah Governorate for the winter season 2015/2016 using nine varieties of wheat bread (Tamoze 1, Tamoze 2, Maksebak, Sabah, Eba 95, Latifia, Eba 99, Abu Ghraib and Sham 6). RCBD Used design with three replicate in order to estimation of some genetic parameters and correlation of bread wheat varieties under the experiment Diwaniyah to determine the most effect characters on yield that can be used as guide to select and improve the yield, an account Genetic and phenotypic variation, correlation coefficient, inheritance ratio in broad and narrow expected genetic improvement ratio for character height plant, number of Branches, spike length, number of grains spike, weight of 1000 and yield. The results showed that there were significant differences between the cultivars, with the superiority of the Eba 99 by giving the highest rate of 1043.3kg / acre between the varieties. There were significant differences between the studied characters Abu Ghraib 99 the superiority in number of branches, length of spick, number of the seed spick and weight of 1000 grin their average (11.33, 12.0, 66.3 and 47.3gram, respectively), which were positively reflected in grain yield. The genetic, environmental and morphological differences of the studied character were significant and the values of the genetic and phenotypic factors were correlated to most traits and inheritance in the broad sense higher (0.592 - 0.728). As an average percentage medal of most traits, but genetic and phenotypic correlation were significant in the desired direction of most yield and therefore yield can be considered as an electoral tool in breeding and plant improvement programs.

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Introduction

Triticuam estivum is one of the world's leading grain crops. It represents the main food for more than 2.5 billion people in the world. The productivity of the unit in Iraq is low and represents only 30% of the productivity of the World Area Unit. Therefore Iraq imports more than two thirds of its wheat needs (Al-Qasim, 2009).

The sensitivity of the wheat crop to environmental changes and conditions necessitates the study of environmental genetic interference that plays a role in changing the plant's phenotypic values, understanding the nature of the environmental genetic interference inevitably prepares the researcher for the behavioral knowledge and response of these varieties and enables him to discover its genetic potential by synchronizing the growth stages with thermal and photovoltaic conditions Suitable reflected in increased productivity (Al - Maliky, 2017).

Despite of spread some genotypes and varieties of local and imported, the cultivation of this crop in Iraq is still below the required level, so it is important to breeding and improvement to make a significant increase in grain yield and improve the quality through the implementation of breeding and improvement programs, Evaluating of performance of the existing and introduced varieties is the first step of the breeding program and its testing in several environments will provide a lot of electoral evidence and provide an opportunity to evaluate the genetic and environmental effects that are helpful factors for the selection and genetic improvement expected, in addition to the associations that represent scale of the strength of relationship among them (Al-Sahuki *et al*, 1983).

To improve the different traits it is important to estimate the expected genetic improvement as it is the largest application of the theory of quantitative inheritance in the programs of breeding and improvement of plants, which determine the method of election to improve the qualities, especially the grain. Genetic improvement expected to be the result of the multiplication of the intensity of selection in inheritance in the standard deviation of phenotypic variation (Johanson *et al*, 1955 and Kempthorme, 1957) on the expected genetic improvement of a quantitative value as the sum of genetic improvement on the arithmetic average as a percentage.

The yield of grain characteristic is characterized quantities complex genes and is highly correlated with the growth characteristics and components of bread wheat. Therefore, the knowledge of the genetic and appearance associations that serve the breeder in the diagnosis of the most relevant traits here is the importance of searching for superior varieties and evaluating their behavior Genetics by studying the differences and phenotypic and genetic correlations between pairs of different quantitative characteristics and inheritance ratios in the broad and narrow sense. The estimation of some genetic information such as inheritance that provides information on the transmission of attributes from parents to their offspring as well as allows to escape The correlation coefficient is useful if the indirect selection of the secondary label is used to improve the basic character. Therefore, the success of the breeding methods depends on breaking the negative correlation between the components. The owner of the wheat and its quality.

The study aims at evaluating the performance of a number of wheat varieties, estimating the components of variability, genetic and phenotypic links, inheritance and genetic improvement expected to reach the best species for adaptation as a breeding material prepared for the crop under the conditions of Al- diwaniyah Governorate

Materials and methods

2.1. Field experiment

A field experiment was carried out in the field of one of the farmers of Diwaniyah during the winter planting season (2015/2016) to study the estimation of some of the genetic parameters in nine varieties of bread wheat (Tamoze 1, Tamoze 2, Mexibak, Sabah, Eba, 95, Latifia, Eba 99, Abu Ghraib and Sham 6). The General authority for agricultural research applied an experiment according to the design of complete random sectors (RCBD) with three replicates in sandy soil. The seeds were planted on 15/11 at 120kg/ha on the lines of the distance between the line and the last 20 cm. Fertilizers were added according to the recommendations of the fertilizer with 50kg/acre of urea 46% nitrogen on the first two steps after 30 days of planting and the second at the point of expulsion of the ears and 50kg/Acres of phosphate fertilizer (Super Phosphate) at one time when tillage and field operations were conducted whenever needed.

The experimental unit area (5 x 4 m^2). The total height of the plant (cm), the number of branches, the length of the spike (cm), the number of grains, the weight of 1000 (g), the total Yield (kg/acre) after collecting the data for studding yield and their classification and then analysis according to the design used (Genetic and environmental) based on the expected mean variance according to the fixed model.

The genetic and environmental variations were examined from zero in the way they were developed (Kempthorme, 1969). The differences between the phenotypic variables and the environmental (Mather and Jinks, 1982). In the broad sense in the way explained by Falconer (1981). The limits of inheritance in the broad sense, (Hanson and Comstock, 1956) and part as stated (Ali, 1999), were less than 40%, 40-60% average, and more than 60%, and the expected genetic improvement according to the method explained (Kempthorme, 1969) are less than 10% and 10-30% are average and more than 30% are higher (Ahmed *et al*, 2007). The environmental genetic and morphological correlation coefficients between the pairs of yield were estimated (Walter, 1975).

2.2. Data analysis

The data were analyzed statistically according to the variation analysis method (ANOVA) for R.C.B.D, the sequencing of splinter panels and the use of the last significant difference test (L.S.D) to compare arithmetic means of treatment at a level of probability (5%).

Results and discussion

The result in table (1) indicates that the analysis of variability of cultivars was significant and below the 5% probability of plant height, number of tiller, number of grains in spike, length of spike, weight of 1000 grain, and grain yield, except for weight of 1000, was insignificant. Genetic factors and their differences in response to the environment of varieties of varieties, which gives the breeder an opportunity to evaluate the performance on the one hand and the selection of the best qualities of educational programs agreed results with (Ahmed and Abbas, 2010 and Al-Jubouri *et al*, 2014).

Table 1. Analysis of variance of the studied characters.

S.O.V	character / df	Plant height/cm	Number of tiller	Length of spike/cm	Number of spike grains	Weight of 1000 grain/cm	Yield grain/kg
Rep	2	1.593	1.148	0.704	0.481	5.333	20734.259
Variety	8	*215.426	*11.259	*4.565	*139.120	n.s135.917	*30743.981
Error	16	73.676	3.065	1.412	45.440	55.417	11015.509

Table (2) shows the average of the varieties of the studied traits. The differences were significant for the character, which wear excellent (Eba 99) in number of tillers, the length spick, the number of grains in the spike, and the weight 1000 grain, which were (11.3, 12.0 cm, 66.33 and 47.33 respectively) that effected on total yield which is the highest yield of 1043.33kg / acre but the Sabah is excellent in other verity higher plant which gave (104 cm), and the less values of the studied traits among the other varieties, explain. Table (2) shows that differences in morale and superiority are due to variation in genetically modified species. The results showed that there were significant differences between the averages of the traits, including (Akcura, 2006., Ayoub, 2004 and Ahmed and Abbas, 2010).

Table 2. The mean of the studied characteristics in Diwaniyh.

Character / Cultivars	Plant height/cm	Number of tillers	Length of spike/cm	Number of spike grains	Weight of 1000 grain/cm	Yield/kg
Tamoze 1	80.000	8.000	9.333	61.000	32.333	785.000
Tamoze 2	83.000	6.333	9.000	60.000	30.333	700.000
Mexibak	95.667	6.000	9.000	60.000	31.333	853.333
Sabah	104.667	9.667	11.000	61.333	38.333	983.333
Eba 95	89.667	5.000	8.000	47.333	24.333	816.667
Latifia	93.000	8.000	8.667	63.333	34.333	853.333
Eba 99,	102.667	11.333	12.000	66.333	47.333	1043.333
Abu Ghraib	100.667	7.667	10.000	56.333	30.667	863.333
Sham 6	95.333	8.667	9.333	46.667	27.000	863.333
L.S.D 0.05	14.858	3.030	2.057	11.668	n.s.	181.674

Table (3) shows some estimates of some of the statistical parameters of genetic characteristics of the studied traits to determine the validity of these varieties as a source of desired qualities through the knowledge of the quantitative variance in which these are the variance and standard error and the difference coefficient.

It is noted that there is an increase in the values of genetic and phenotypic variation compared to the environmental variability in the studied traits and gives evidence that the genes play a significant role in showing the character and hence the effective selection and gives the plant breeders the opportunity to select the genetic material in the breeding programs directly for their low impact in the environment.

The values of the environmental difference coefficient were low for the height of the plant and height of the spick and the number of grains was (5.280, 7.152 and 6.706, respectively), while the coefficient of genetic variation was mean to the number of branches and the weight of the one thousand respectively (21.049 ; 15.750, respectively). The phenotype different coefficient value is The number of branches, the weight of a thousand cubits, the length of the stems, the total number, the number of grains and the height of the plant respectively were 24.67, 20.466, 12.859, 11.738, 11.734 and 9.029 respectively.

These high values indicate the significant effect of environmental factors on the phenotypic expression of the characteristic (Ehdaie, 1989). The same table indicates that the values of inheritance in the broad sense were within the average range of the weight of the grain and the height of the other yield, ranging from (0.592 - 0.728 according to (Ahmed *et al*, 2007). Also the result (Table 3) show that values of genetic improvement expected as a percentage of the general mean of the studied traits are (ranged between the low and medium of the studied traits as they were low for the plant height and the average in the characteristics of the number of tiller and the length of the number of grains in the spike and the weight of its thousand and its plant according by (Bahlouli, 2005) and where the coefficient of genetic variation was followed to the coefficient of phenotypic variation in its behavior of most of the high qualities and values of inheritance in the broad sense reflected on the values of genetic improvement expected as a percentage. The results agreed with (Rachid, 1989., Falconer, 1981 and Ayoub, 2004). The values of phenotypic variation were high The winner I followed the recipe plant height and the number of grain and then 1000 garn weight 10247.9, 71.80, 46.37 and 45.30, respectively, and these indicators inferred from which the power capacity in the electoral process in the education programs and the possibility of utilization of the sum agreed results with the findings (Falconer, 1981).

The purpose of studying the correlations between the different yield is to identify the most relevant characteristics of the product to determine the experimental evidence that benefit the plant breeders for using them for selection and hybridization programs for the purpose of increasing the quantity of the yield. The quality of most studies indicates that the genetic correlation values are higher than the phenotypic correlation values, the phenotypic composition either in the case of the correlation of the genetic correlation values with the phenotypic correlation values will show significant changes in the elected personality more than expected. (Hanson, 1956) Environmental genetic interference also reduces the association between the genetic and phenotypic values, For the amount of progress resulting from the election (Al – Maliky, 2017).

Table 3. Some statistical and genetic constants of the studied yield.

Character / Parameter	Plant height/cm	Number of tillers	Length of spike/cm	Number of spike grains	Weight of 1000 grain/gm	Yield/kg
Average	93.852	7.852	9.593	58.037	32.889	862.407
environmental variation	24.559	1.022	0.471	15.147	18.472	3671.836
standard error	24.559	1.022	0.471	15.147	18.472	3671.836
Genetic variation	47.250	2.731	1.051	31.227	26.833	6576.157
standard error	33.141	1.713	0.698	21.344	21.176	4743.637
Phenotypic variation	71.809	3.753	1.522	46.373	45.306	10247.994
standard error	20.729	1.083	0.439	13.387	13.079	2958.341
Environmental difference coefficient	5.280	12.873	7.152	6.706	13.068	7.026
Genetic difference coefficient	7.324	21.049	10.687	9.629	15.750	9.403
Phenotype difference coefficient	9.029	24.673	12.859	11.734	20.466	11.738
Broad inheritance	0.658	0.728	0.691	0.673	0.592	0.642
Expected genetic improvement	8.643	2.185	1.321	7.108	6.179	100.690
Expected genetic improvement as a percentage	9.209	27.833	13.766	12.247	18.788	11.675

Table (4) shows the environmental, genetic and phenotypic correlation coefficients between the pairs of studied traits. The correlation coefficient values are higher than the phenotypic correlation coefficients of the studied traits. The effect of the correlation was related to the traits of plant height, number of branches, length of sap, there was a significant environmental correlation in the number of grains with spike. This is evidence that the increase in the components obtained led to an increase in the total yield. The results showed that there was a negative genetic correlation between the number of grains with the height of the plant. There is a high environmental correlation between the number of grains with the number of branches.

Table 4. Environmental, genetic and descriptive links to studied traits.

Characters	Link	Yield	Weight 1000 grain	Number spike grain	Length of spike	Number of tiller	Plant height
Plant height	rE	**0.745	0.195	0.409	0.357	0.133	1
	rG	**0.928	**0.788	-0.004	**0.808	**0.746	1
	rP	**0.864	*0.518	0.134	**0.661	*0.557	1
Number of tillers	rE	*0.514	**0.711	**0.670	**0.763	1	
	rG	**0.913	**0.843	0.406	**0.943	1	
	rP	**0.785	**0.771	0.484	**0.890	1	
Length of spike	rE	**0.661	**0.724	0.389	1		
	rG	**0.886	**1.100	*0.602	1		
	rP	**0.810	**0.917	*0.534	1		
Number spike grains	rE	*0.518	**0.799	1			
	rG	0.217	**0.768	1			
	rP	0.320	**0.763	1			
Weight 1000grain	rE	0.421	1				
	rG	**0.963	1				
	rP	**0.755	1				
Yield	rE	1					
	rG	1				r 0.05=0.497	
	rP	1				r 0.01=0.623	

The results indicated that the length of the spike was associated with genetically and phenotypic ally high with the height of the plant and the number of branches. Also, the number of branches was associated with genetically high correlation with plant height and a significant correlation of the same characteristic. With most qualities and thus can improve the status of the outcome through the direct election of its components agreed results with the findings (Walter, 1975 and Al-Jubouri *et al*, 2014) at last the cultivar (Eba 99) can be grown in more than one environment and season for better selection and to determine the stability of this variety under the conditions of the study environment.

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