GENETIC PARAMETERS OF GENOTYPE OF WHEAT (*TRITICUM AESTIVUM* L.)

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Abstract

A field experiment was carried in Agricultural Research Center in Latifia, Ministry of Science and Technology (20 km) south of Baghdad for the seasons 2012/2013 and 2013/2014 using seven genotypes of wheat using split plot with RCBD design and three replicates: 1. Significant differences for most traits studied in first season for Furat genotype, plant height, spike number /m^2, branches number/m^2 with 82.60 cm, 200.33, 217.66 for the first season, 96.26 cm, 179.66 and 194.66 for second season respectively. Genotype M9 was superior for yield 606.66 g /m^2 for the first season, while in the second season the cultivar was superior to Furat with 618.33 g/m^2. 2. The genetic variation was greater than the environment variation for most traits, indicating the greater role of genetic variation. The Heritability percentage was high for branches number /plant and medium for the rest of the traits. The genotypic and phenotypic variation coefficient were the average values for most traits while the genetic yield was high for M8, M12 and Tmoz3 The M11, M10 and M8 genotypes were highest Hemostasis for two environment .

Key words: Wheat, Genetic variation, genotype.

Introduction

Bread Wheat (*Triticum estivum* L.) is one of the main grain crops in Iraq. For the purpose of evaluating the new genotypes, it is necessary to take care of them in different environments and compare their performance to the local variety. The new genotypes must possess the high yield genes as well as other important traits. Which is acceptable to the farmer. On the other hand, it is not possible to distinguish between the agricultural methods used and the breeding program. The new classification, whether it is input or derived, will eventually be applied to the agricultural methods used, including the quantity of seed used. Space and then the number of spikes per unit area, one of the main components of the sum of grain in the wheat (Rashid, 1989).

In addition, it is important to estimate the phenotypic, genetic, environmental, phenotypic, genetic, phenotypic, genetic and genetic factors that are expected to be inherited. Which determines the basis of the method of election used to improve the declared qualities, especially the grain, as it achieves the increase in the result of a number of interrelated components, so the correlation coefficient between the sum and its components Zith to direct and indirect effects by analyzing the path coefficient helps determine the influential main component holds grain which can be on the way to improve the status quotient of grain (Ahmed, 2003).

It is important to take care of plant breeders when the introduction of new genotypes in the program of the performance of good under different environmental conditions and different qualities of the grain comes in the forefront of these qualities, the sum of complex quantitative qualities controlled by several genes and the response of the genetic structures of environmental changes and this is due to the non-stability of the characteristics of these structures when planted in different environmental conditions, which is an obstacle to determining the superiority of them. Therefore, estimating the interference between the genetic and environmental structures and determining the stability of the new structures are important criteria to be considered Therefore, the performance of the genotypes is tested in different agricultural sites and parameters. The variety of the variety is given in the field unit for several years

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and under different agricultural parameters. It is important to determine the stability of the genotype and its performance in a wide range of different environments (Trethowan *et al.*, 2012).

This study aims at:

1. Evaluation of the performance of some new genotypes of wheat and the two seasons to determine their adaptation to environmental conditions and to compare them with local varieties.

2. Evaluation of some genotypic parameters such as phenotypic, genetic and environmental differences, phenotypic and heritability differences, inheritance and expected genotypic improvement in new genotypes, which are selected and study the stability of genotypes and the genotypic outcome of the study seasons.

Materials and Methods

This experiment was carried out in Agricultural Research Center in Latifia, Ministry of Science and Technology, which is located 20 km south of Baghdad for the seasons 2012/2013 and 2013/2014. Seven genotypes of soft wheat were used and obtained from the above. On the first of December 2013 and 2014, agriculture was in lines of 2.5 m and the distance between the lines was 15 cm and the distance between the plants was 10 cm. Four lines of each genotype were planted using spilt plot with RCBD design with three replicates and added 50 kg /d, 45 kg/d fertilizer leaving urea 46% N after planting and three batches. The studies were carried out on (10) plants taken randomly from the middle lines of each genotype. The study included the following characteristics.

1. number spike/m^2

2. grain yield: This is the product of the lines of the middle and was converted to a cloud / m^2.

3. Biologic yield: calculated by plant weight with gm/m^2.

4. Weight of 1000 grain in grams.

5. Harvest index%: Calculated using the following equation mentioned before Sharma and Smith (1986).

Harvest index = Economic yield / Biologic yield.

Genetic analysis

The analysis of phenotypic, genetic and environmental variance was estimated according to the method explained by Walter (1975).

$$\sigma_v^2 = \sigma_G^2 = \frac{Msg - Mse}{r}$$

$$\sigma_E^2 = Mse$$

$$\sigma_P^2 = \sigma_G^2 + \sigma_E^2$$

Heritability and Expected genetic advance

As estimated in the manner explained by Hanson and others (1956) and as follows:

$$H^2_{B.S} = \frac{\sigma_G^2}{\sigma_P^2} \times 100$$

$$G.A = K.H^2_{B.S.}\sigma_P$$

As:

K The intensity of the election is equal to 2.06 when electing 5% of the plants.

The predicted genetic improvement was estimated in the way that it was explained (Kempthorme, 1969).

$$E.G.A = \frac{G.A.}{X^-} \times 100$$

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whereas :

E.G.A represents the expected genetic improvement as a percentage of the overall mean.

G. represents the expected genetic improvement

A. represents the average character

The predicted genetic improvement was estimated in the manner explained (Kempthorme, 1969).

Determination of Phenotypic and Genotypic Different Coefficiens.

The values of the phenotypic and hereditary differences were calculated according to the method explained by Falconer (1981) and as follows:

$$P.C.V \% = \frac{\sigma_P}{X^-} \times 100$$

$$G.C.V \% = \frac{\sigma_G}{X^-} \times 100$$

As:

P.C.V Factor of phenotypic variation

G.C.V Genetic Variation Factor

Results and Discussion

From table 1, there are significant differences between the genotypes of the studied traits. Furat genotype exceeds the traits of the number of branches / plants and the height of the plant and the number of spike

Table 1: Performance of the genotypes for the season 2012/2013.

L.S.D	C.V	Tmoz3	Furat	M2	M1	Genotype Qualities
51.62	21.24	115.33	217.66	160.00	168.0	Number of branches /spike m^2
10.51	17.56	27.80	17.76	34.23	32.23	Weight 1000 g
200.3	28.91	600.00	293.33	606.66	420	Yield G / m^2
99.55	255.75	2115	1885	2200	2000	bio. Yield g m^2
6.14	7.65	28	15	27	21	Harvesting index

Table 2: Performance of the genotypes for the season 2013/2014.

L.S.D	C.V	Tmoz3	Furat	M2	M1	Genotype Qualities
51.62	21.24	115.33	217.66	160.00	168.0	Number of branches /spike m^2
10.51	17.56	27.80	17.76	34.23	32.23	Weight 1000 g
200.3	28.91	600.00	293.33	606.66	420	Yield G / m^2
99.55	255.75	2115	1885	2200	2000	bio. Yield g m^2
6.14	7.65	28	15	27	21	Harvesting index

/m^{2}and the number of branches/m^2 by giving 34.56, 82.60, 200.33, 217.66 of the above qualities respectively, while the genotype Tmoz3 exceeds for length spike, yield, by giving 18.33 cm, 600g, but the quality of the harvest index was higher than genotype Tmoz3 that of the yield category 28% of these results are consistent with what he found (Reekie *et al.*, 2002 and Milken *et al.*, 2008).

Table 2, shows that there are significant differences in the second season for the studied traits, as the Furat genotype exceeded the height of the plant, the number of spikes / m^2, the number of branches / m^2 and the harvest guide, giving them 96.26, 179.66, 194.66 and 27% respectively. M9 with 30.66 branches / plants.

Table 3, shows the genotypic, environment and phenotypic values of the first season. The genetic variance. The value of environmental variation was 4.73.

Table 3: Genetic, Environmental and Phenotypic Varian's for season 2012/2013.

H^{2}bs	G.C.V	P.C.V	ϵ^{2}P	ϵ^{2}G	ϵ^{2}E	Varian's Qualities
70.526	31.795	37.861	2291.3	1615.915	675.31	Number of spikes / m^2
25.237	26.068	31.423	111.759	76.853	34.904	Weight 1000 g
46.763	25.237	36.893	28919.59	13532.27	15387.3	Yield G / m^2
45.45	8.16	17.97	3712.72	1687.57	2025.15	bio. Yield g m^2
56.16	14.69	14.55	3160.59	1775.24	1385.35	Harvesting index

Table 4: Genetic, Environmental and Phenotypic Varian's for season 2013/2014.

H^{2}bs	G.C.V	P.C.V	ϵ^{2}P	ϵ^{2}G	ϵ^{2}E	Varian's Qualities
48.400	28.520	41.000	2470.30	1195.767	1274.540	Number of spikes / m^2
96.614	25.301	25.741	89.684	86.647	3.037	Weight 1000 g
43.794	17.654	26.678	16955.19	7425.300	9529.762	Yield G / m^2
44.48	8.71	19.59	4168.71	1854.36	2314.25	bio. Yield g m^2
54.04	8.34	15.43	3460.32	1870.12	1590.20	Harvesting index

This is a small comparison to the genetic variance, which confirms the greater role of genetic variation, because it has a relatively larger variance of 61.43, indicating that the environmental variance was superior to the genetic variance by giving a greater percentage of phenotypic variation of 3.48. Pat 27.27 compared to the value of environmental variation, which amounted to 24.38 while phenotypic variation was 51.64, as for the number of spike. M2, the value of genetic variance is 1615.91 and the value of environmental variability is 675.31. These are few compared to genetic variance, which confirms the greater role of genetic variation because it is relatively larger compared to the descriptive variance of 2291.32. M2 2072.76 for grain weight, the genetic variance was 76.85 and the environmental variance was 34.90 compared to the phenotypic variance of 111.75. The genetic variance was 13532.27 compared to 15387.30, which indicates the greater role of genetic variability of this characteristic. The variance of the phenotypic variance was 28919.59, whereas the biogenic yield exceeded 2025.15 compared with the genetic variance 1687.57. The harvest guide 1775.24 on environmental variability was 1385.35 because it is relatively larger compared to the phenotypic variation of 3160.59.

The percentage of Heritability in the broad sense was high for the weight of the grain by 36.31%, yield, biologic yield and harvest index were 52.81, 46.76, 45.45 and 56.16%. The values of the phenotypic and genotypic variation coefficients of the studied traits, where these values varied within the single genotype for the seasons. Based on the ranges used by Rasheed (1989), which are less than 10%, 10-30% and more than 30% Ranged between low, medium and high for all attributes and for both seasons. In the first season, the values of the phenotypic and hereditary differences were low. The genetic difference coefficient for the biologic. The values of the genetic variation were medium for the weight of the grain, the grain yield and the harvest index. The values of the genetic and phenotypic differences were high for the number

of branches/ m². This is consistent with what was found by (Ibrahim *et al.*, 2002 and Peters *et al.*, 2008).

Table 4, shows the genetic, environmental and phenotypic values of the second season. The variance of the genetic variance was 65.69 for The value of the environmental variance was 37.93. This is a small comparison to the genetic variance, which confirms the greater role of genetic variability, because it has a relatively larger variance of 103.62 is noted that the value of the genetic variance was 2.39 compared to the environmental variance of 2.50 indicating that the environmental variation was superior to the genetic variance by giving a greater percentage of phenotypic variation of 4.89 while the genetic variance of compared to the environmental variation was 43.34 while the phenotypic variation was 88.59 and the number spike/m² was observed. The value of the genetic variance was 1195.76 and the environmental variability was 1274.54 compared to the phenotypic variation of 2470.30 and the weight of the grain was 86.64 and the environmental variance was 3.03 Compared to the descriptive variation of 89.68. The variance was 7425.30 compared to the environmental variability of 9529.76, while the variance of the phenotype was 16955.19, whereas the biological yield exceeded 2314.25 compared with the germination of 1854.36, while the genetic variance of the harvesting index was 1870.12 compared to the descriptive variance 3460.32.

The percentage of inheritance in the broad sense was high for the weight of the grain and 92.28%, while the characteristics of the number of spike/m². The biologic index and harvest index were 51.08, 43.79, 44.48 and 54.04%, respectively.

In the second season, the values of the genotypic difference coefficient were low. The values of the genetic and phenotypic differences were medium for the weight of the grain, the grain yield, the biologic yield and the harvest index, whereas the values of the genotypic and phenotypic differences were high for the characteristics of the number of spike/m² This is consistent with what was found by (Ibrahim, 2002 and Milken *et al.*, 2008 and Trethowan *et al.*, 2012).

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