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Evaluation the productivity of promising Genotypes of bread wheat in tow locations

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Abstract:

A factorial field experiment was conducted to evaluate the performance of different genotypes of soft wheat crop at two locations, the first location in the agricultural research and experiments station of the College of Agriculture - Muthanna province and the second location in Al-Gharaf district / province of Thi-Qar. Ten genotypes (IR885, IR899, IR1123, IR981, IR1131, IR969, IR1069) are used and Abu Ghraib, Furat and IPA 99 as local cultivars, Three replicates of each treatment were randomized using a randomized complete block design. The effect of genotypes, locations and the interactions between them has been studied in some growth and yield traits and its components.

The result of second experiment showed that W4 genotype recorded highest grain yield compare to anther promising genotypes and local cultivars Abu Ghraib, Furat and IPA 99 (W8, W9 and W10 respectively) for both Al-Muthanna and Thi-Qar locations in which reached (7.39 and 7.55 ton/ h) for two locations respectively, while the results showed that the superiority of Furat cultivar (W9) giving the highest height plant and number of spikes / m2. Thi-Qar location gave the highest averages for plant height, number of spikes/ m^2, weight of 100 tablets and dry weight/ m^2. Moreover, genotypes in Thi-Qar location gave the highest averages for trails than AL-Muthanna location. The interactions between genotypes and locations, Furat cultivar had superiority in Thi-Qar location, in which gave the highest rate of plant height which reached 113.333 cm, while the

cultivar surpassed IPA 99 (W9) in Thi- Qar location, gave the highest average of leaf area reached 76.633 cm^2.while the interactions between genotype W7 in Thi-Qar location, the highest average of 100 seed weight reached (5.020 g).

Key words: Performance, genotypes, promising, breed wheat, locations

Introduction

Wheat crop *Triticum aestivum* L. is considered the most important strategic grain crops relied on to reduce the food gap, which has become the world's problem, and the wheat are grown in most parts of the world and constitute the basic material for the manufacture of bread. Recent statistical projections indicate that global production will reach 689.8 million tons in 2015 (F.A.O, 2000), and the reason for importance of this crop is being the main food of more than 40 countries in the world (nearly 35% of the world population), Due to its high content of protein and carbohydrates (Curtis, 1982) as it is gave more than 25% needs of calories and protein in addition to contain the amounts of fat and vitamins (B1 and B2) and some mineral salts (Bushuk, 1998).

The rectification a new genotypes and election the superior of them in yield and other traits consider important to creating new varieties that can be an alternative to the local varieties that currently cultivated or in the provision of genotypes can be used to transfer genes of higher yield and resistance to diseases and high protein to local varieties cultivated through the hybridization program (Mustafa, 2003).

The genotype Affects in the plant behavior in terms of vegetative growth, Leaf area chlorophyll content, grain yield and its components, as both (Hucl and Barker, 1988 ; Mohammed, 2000) found that difference of wheat bread genotypes in most vegetative growth traits and grain yield and its components, due to the nature of growth,

capability of branching and total dry matter production, also the good crop and soil preparation practices have a role in increasing the yield, but this increasing did not reach the optimum level. it seems that the ideal solution to this problem is to develop new varieties more suitable for the environmental conditions, so to achieve the goal of increasing a grain yield the plant breeders needs to identify the most important characteristics of growth and the components of yield associated morphologically and genetically directly or indirectly with grain yield for use it as elected evidence. So as a simple correlation measures the connectivity relationships, the coefficient of the path is the best way to identify those relationships because it determines the effects of direct and indirect of the yield traits based on genetic relationships (Gupta et al., 1979) .

Wheat varieties (Maxibak and Saberbek) Still prevailed cultivated in Iraq since long period and characterized in sensitivity for lodging, the incidence of certain diseases, in addition to the lack of purity because of mechanical mixing and accumulated mutations, so now it is necessary to develop new varieties replace or grown along with these varieties , and because of the lack of available studies on the breeding of wheat and the lack of sources of heterogeneity genetic that can be used for breeding purposes , So the goal of this research is to evaluate introduced genotypes of bread wheat different in the length of the growth and maturity from the International Center for maize and Wheat Improvement in Mexico (CIMMYT) with three comparison varieties that adopted in Iraqi agriculture in terms of growth and yield traits and components in order to determine the productive of the different varieties and election of superior varieties under conditions of the southern region of Iraq.

Materials and methods

A factorial field experiment was carried out during 2012-2013 in two locations. The first was agricultural research and experiments station belonging to agriculture college - Muthanna university (10 km north east of Samawa city center), while the second location in Thi-Qar governorate Al-Gharaf district about 26 km north nasseryah city. The experiment was laid out in a Random Complete Block Design (R.C.B.D) with three replications. The soil was prepared and the soil samples collected from (0-20) depth in order to analyzing it and limiting the physical and chemical characteristics as it showed in Table

(1). A field divided into plots the area for each one was $6m^2$ and the grains were cultivated in lines with 6m long and the distance between them was (20 cm) in each experimental plot. The quantity of fertilizer (100 kg P/ h) was used one time when soil was plowed and 200 kg N/ h of urea fertilizer (46% N) was applied at four times (first one during sowing, second when tillers were started, third during spike appeared and fourth during flowering) (Jedua, 1995). Ten Genotypes of soft wheat as in table (2) which illustrates names of Genotypes field symbols and cultivar sources. The studied traits were plant height (cm), flag leaf area (cm^2), number of tillers /plant, dry weight (g/m^2) number of spikes/m^2, number of grains/ spike, 100 seed weight (gm), , grain yield (ton/ ha).

After data collection and tabulation Statistical analysis was performed according to the design above and tested using arithmetic averages less significant difference (LSD) at the average level of probability (0.05).

Table (1) physical and chemical characteristics of soil locations

Traits Location	Texture	PH	EC des/m	Particles%			Minerals%		
				Sand	Loam	Clay	N	K	P
Al-Muthanna	Salty Clay	7.65	4.21	***02***	***93***	***14***	***2072***	***4004***	***2000***
Thi-Qar	Loamy Clay	7.82	3.72	***00***	***19***	***93***	***20.3***	***4093***	***2030***

Table (2) Data of introduced genotypes in study

Genotype	IR885	IR899	IR1123	IR981	IR1131	IR969	IR1069	Abbu Graib	IPA99	Furat
Code	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10
Source				(CIMMYT)				Agriculture Ministry-Iraq		

Results and discussion

The effect of genotypes, locations and interaction on the growth traits

Plant Height (Cm)

The data presented in Table (4) indicated that genotypes significantly affected the plant height. Maximum plant height (105.33 cm) was observed for W10 (local cultivar), whereas minimum value (78.83 cm) was observed for W7 genotype. The reason for that may be due to the genetic nature of genotype, These findings greed with the work Jain et al. (1973) and Ahmed (2003). Also the location were differed significantly between them in this trait in which Thi-Qar location, gave the highest average was (96.40 cm), while AL-Muthanna location gave the lowest average for this trait was (86.30 cm). The reason for this is the nature of the soil Table (1) and environmental conditions. As regards to the effect of interaction W10 genotype gave highest average for this trait was (113.33cm) in Thi-Qar location.

Flag Leaf Area (cm^2)

The result of Table (4) showed that the significant effect of genotypes on flag leaf area where W9 (local cultivar) given highest average of leaf area (64.61 cm^2), while W6 genotype given lowest average for this trait (39.91 cm^2). This result may relate to the genetic diversity, this result is in agreed with the findings of the Cardeneir *et al.* (1990), also the interaction among W9 genotype in Thi- Qar location recorded the highest average for this trait (76.63 cm^2), while D6 genotype in AL-Muthanna location gave the lowest average for

this trait was (39. 00 cm^2). The reason for this is interaction effect of environmental and genetic factors. Results show that location had not significant in this trail.

Number Tillers/ Plant

Results showed that the significant effect of genotypes on number of tellers per plant. W1 genotype gave highest number tillers per plant (5.83 tillers/ plant), while W7 genotype gave lowest average (2.16 tillers/ plant). The reason for that is the formation of tillers depend on cultivar, applied fertilizers, cultivation date and environmental conditions, this result is in agreement with the findings of Sharma and Sirvastava (1980) and AL- Anbari (2004) and AL-Hassan (2007). Also Thi-Qar location was superior to giving highest average of this trait (4.31 tiller/ plant), while AL-Muthanna location gave lowest average (3.38 tillers/ plant) (Table 4). The reason for that is the nature of the soil and minerals content (Table 1). Results show that interaction effect had not significant.

Dry Matter Weight (gm/ m^2)

Results of Table (3) showed that the significant effect of Dry matter weight where W2 genotype given highest weight (335.83 g), while W3 genotype given lowest weight for this trait (147.50 g/ m), this result is in agreed with the findings of the AL-Fahdawi (2010), also Thi-Qar location was superior to giving highest weight reached (245.70 g/ m^2) compare to AL-Muthanna which gave (223.50 g/ m. Results show that interaction effect had not significant.

Table (3) Effect of genotypes, locations and interaction on studied growth traits

Characteristics	Variety	Locations AL-Muthanna	Thi-Qar	Varieties Average
	W1	**93.33**	**96.00**	**94.67**
	W2	**88.32**	**85.00**	**86.66**
	W3	**84.00**	**97.67**	**90.83**
	W4	**88.67**	**92.33**	**90.50**
Plant height (cm)	**W5**	**82.33**	**97.32**	**89.83**

	W6	**82.33**	**100.66**	**91.50**
	W7	**72.33**	**85.31**	**78.83**
	W8	**94.00**	**111.67**	**102.83**
	W9	**80.31**	**84.66**	**82.50**
	W10	**97.32**	**113.33**	**105.33**
	Location average	**86.30**	**96.40**	
		variety==	**location**	**=interaction =**
	L.S.D (0.05)	**2.74**	**1.22**	**3.87**
	W1	**51.26**	**49.67**	**50.46**
	W2	**48.90**	**45.13**	**47.01**
	W3	**65.23**	**51.60**	**58.41**
	W4	**53.83**	**54.16**	**54.00**
Flag Leaf areas (cm^2)	**W5**	**52.31**	**51.93**	**52.12**
	W6	**39.00**	**40.83**	**39.91**
	W7	**47.16**	**48.13**	**47.65**
	W8	**53.20**	**53.20**	**53.20**
	W9	**52.60**	**76.63**	**64.61**
	W10	**42.87**	**57.00**	**49.93**
	Location average	**50.63**	**52.83**	
		variety	**=Locations=**	**interaction =**
	L.S.D (0.05)	**6.97**	**N.S**	**9.86**
	W1	**5.00**	**6.67**	**5.83**
	W2	**3.33**	**4.00**	**3.66**
	W3	**4.13**	**4.53**	**4.33**
	W4	**4.37**	**4.97**	**4.17**
Tillers number/ Plant	**W5**	**2.00**	**4.00**	**3.00**
	W6	**4.00**	**4.00**	**4.00**
	W7	**2.00**	**2.32**	**2.16**
	W8	**2.33**	**3.66**	**2.99**
	W9	**4.33**	**5.00**	**4.66**
	W10	**2.33**	**4.00**	**3.16**
	Location average	**3.38**	**4.31**	
		variety	**=locations**	**=Interactions =**
	L.S.D (0.05)	**1.27**	**0.57**	**N.S**
	W1	**208.33**	**243.33**	**225.83**
	W2	**316.67**	**355.00**	**335.83**
	W3	**133.33**	**161.67**	**147.50**
Dry matter weight (gm/ m^2)	**W4**	**203.32**	**213.33**	**208.33**
	W5	**238.33**	**250.00**	**244.17**
	W6	**290.00**	**306.67**	**298.33**
	W7	**206.67**	**216.66**	**211.67**
	W8	**193.33**	**208.66**	**201.00**
	W9	**245.00**	**286.67**	**265.83**
	W10	**200.00**	**215.00**	**207.50**
	Locations average	**223.50**	**245.70**	
		Cultivars	**Locations**	**Interactions =**
	L.S.D (0.05)	**=16.27**	**= 7.28**	**N.S**

Effect of genotypes, locations and interaction on yield and its components

Spike Numbers/ m^2

The result of Table (5) showed that the significant effect of genotypes on number of spikes/ m^2 where W10 genotype (local cultivar) given maximum number of spikes (805.33 spike/m^2), while W7 genotype given minimum number for this trait (447.17 spike/ m^2). Our results are in conformity with the work of Acevedo *et al.* (2002) and Ahmed (2003). Also Thi-Qar location was superior in this trait giving maximum number reach (615.00 spike/m^2), while AL-Muthanna location given minimum average (588.80 spike/m^2). Interaction effect had not significant.

Grain Number / Spike

The results of Table (5) showed that the significant effect of Number of seeds/ spike where W7 genotype given highest rate of seed (97.00 grain/ spike) while W2 genotype given lowest average for this trait (37.00 grain/ spike). This result may relate to the genetic diversity. This result is agreement with the findings of Curtis, (1982) and AL-Hassan, (2007). Results show that location and interaction effect on grain number per spike had not significant.

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Weight of 1000 Grain (g)

Results showed that the significant effect of weight of 1000 grain, where W7 genotype given highest rate (40.91 g), while W1 genotype given lowest average for this trait (20.44 g) may be due to the genetic nature of cultivar in which cultivars differ in genetic susceptibility. Our research has a great similarity with Ahmed, (2003) and AL- Anbari, (2004). Results of interaction between genotypes and locations show that W7 genotype in Thi-Qar location gave highest average (50.02 gm), while W1 genotype in AL-Muthanna gave lowest average (20.41 gm) (Table 5).

Grain Yield (ton/ h)

Results of Table (5) showed that significant effect of grain yield. W4 genotype gave highest yield (6.47 ton/ ha), while W8 genotype (local cultivar) gave lowest yield for this trait reached (3.37 ton/ ha). The imbalance between of yield components lead to increasing of grain yield for W4. Similar results were also communicated by Sharma and Smith (1987), and AL- Anbari (2004) and AL-Hassan (2007). Also the results showed the significant effect of locations which Thi-Qar location gave highest yield (4.97 ton/ h), while AL-Muthanna location gave

lowest average (4.67 ton./ h). The interaction between genotypes and locations showed significant effect when W4 genotype in Thi-Qar and AL-Muthanna locations significantly gave the highest grain yield height average (6.55 and 6.39 ton/ h) respectively.

Table (4) Effect of Genotypes, Locations and interaction on yield and its components

Characteristics	Variety	Locations		Varieties Average
		AL-Muthanna	Thi-Qar	
Spike numbers (m^2)	W1	497.00	514.66	505.83
	W2	662.66	685.33	674.00
	W3	606.67	635.33	621.00
	W4	641.65	646.00	643.83
	W5	513.33	544.67	529.00
	W6	661.66	685.67	673.67
	W7	433.33	461.00	447.17
	W8	531.00	581.66	556.33
	W9	558.33	567.33	562.83
	W10	782.32	828.33	805.33
	Location average	588.80	615.00	
		Variety	=location	=
	L.S.D (0.05)	21.03	21.03	Interaction=N.S
Grain numbers/ Spike	W1	73.00	76.33	74.66
	W2	35.00	39.00	37.00
	W3	49.33	53.66	51.50
	W4	66.32	68.33	67.33
	W5	61.00	58.00	59.50
	W6	46.33	44.32	45.32
	W7	82.00	76.00	79.00
	W8	48.67	44.67	46.67
	W9	56.00	54.66	55.33
	W10	48.00	45.00	46.50
	Location average	56.56	56.00	
		Variety=	Locations	
	L.S.D (0.05)	3.98	N.S	Interaction N.S
Weight of 1000 grains (gm)	W1	20.41	20.48	20.44
	W2	40.43	40.45	40.45
	W3	40.03	40.07	40.05

	W4	**40.34**	**40.28**	**40.31**
	W5	**40.41**	**40.08**	**40.25**
	W6	**30.20**	**30.27**	**30.23**
	W7	**40.81**	**50.02**	**40.91**
	W8	**30.18**	**30.34**	**30.26**
	W9	**20.76**	**20.82**	**20.79**
	W10	**20.95**	**30.41**	**30.18**
	Location average	**30.65**	**30.72**	
	L.S.D (0.05)	**variety 2.66**	**=Location= N.S**	**Interactions=3.76**
Grain Yield (ton/ ha)	**W1**	**3.49**	**3.87**	**3.68**
	W2	**4.10**	**4.76**	**4.43**
	W3	**4.81**	**5.55**	**5.18**
	W4	**6.39**	**6.55**	**6.47**
	W5	**5.53**	**5.15**	**5.34**
	W6	**3.92**	**3.97**	**3.94**
	W7	**5.84**	**6.03**	**5.93**
	W8	**3.28**	**3.47**	**3.37**
	W9	**3.45**	**3.50**	**3.47**
	W10	**3.96**	**4.88**	**4.42**
	Locations average	**4.67**	**4.97**	
	L.S.D (0.05)	**variety 394.20**	**=Locations 176.28**	**= Interactions=662.31**

Conclusion

W4 genotype has given the highest grain yield in Thi-Qar and AL-Muthanna locations compare to anther promising genotypes and local cultivars (Abu Ghraib, Furat and Ipa 99)

Recommendation

The study recommends the followings

1) Agriculture extension agent should encourage farmers to use W4 soft wheat genotype in Thi-Qar and AL-Muthanna locations

2) This research should repeat in other locations to have promising genotype stability.

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