Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.5, No.13, 2015

Evaluation of Wheat *Triticum aestivum* L. Genotypes with High Productivity in Al-Muthanna and Thi-Qar Provinces

Faisal, M. Al –Tahir[1] Saad, A. Al-badry [2] Salih H. Al Salim[3]
1 Field crop Department, College of Agriculture/ University of Al- Muthanna
2 Field crop Department, College of Agriculture/ University of Thi-Gar
3 Plant Production Thi–Qar Agriculture Directorate Agriculture Ministry

Summary
A 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 station and trials of the College of Agriculture / Muthanna province and the second location in Al-Garraf district / province of Thi- Qar. Ten genotypes (IR885, IR899, IR1123 , IR981, IR1131, IR969, IR1069) are used and Abu Ghraib, Furat and IBA 99 as comparison cultivars) , Three replicates of each treatment were randomized using a randomized complete block design factorial experiments. The effect of genotypes, locations and the interactions between them has been studied in some growth and yield traits and its components. IR98 genotype record higher rate of seed yield kg / donum for both Al-Muthanna and Thi- Qar locations in which reached (1847.667 and 1889.000 kg / donum), respectively while the results showed that the superiority of Furat cultivar giving the highest rate of height plant, spike length and number of spikes / m 2 which reached (105.333 cm and 17,000 cm and 805.333 spike / m 2), respectively. As well as my agriculture disagreed with each other in most of the studied traits where the second location (Thi-Qar) gave the highest averages for plant height and spike length and number of the forest and the number of spikes / m 2 and weight of 100 tablets and dry weight / m 2 and holds the grain reached (96.400 cm and 14,800 cm and 8.600 and 615.000 spike / m 2 and 3.725 g and 245.700 g / m 2 1889.000 kg / sq.m), respectively.
With regard to the interactions between the genotypes and locations, Furat cultivar had superiority in Thi- Qar location, in which gave the highest rate of plant height and spike length which reached (113.333 cm and 20.000 cm), respectively, while the cultivar surpassed EBA 99 in Thi- Qar location, giving the highest rate of Leaf area reached (76.633 cm 2) while the interactions between genotype IR1069 in Thi- Qar location, the highest average of 100 seed weight reached (5.020 g).
Keywords: Performance evaluation , genotypes , fine wheat, agricultural 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 (13), 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 (12) as it is gave more than 25% needs of calories and protein (11) in addition to contain the amounts of fat and vitamins (B1 and B2) and some mineral salts (11).

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 (5) .

The genotype Affects in the plant behavior in terms of vegetative growth, Leaf area chlorophyll content, grain yield and its components , as both (8 and 15) 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 (14) .

Wheat varieties (Maxibak and Sabrbek) 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 field experiment was carried out during 2012-2013 in two locations. The first was agricultural research and experiments station belonging to agriculture college/Al-Muthanna university/3km north east of Samawa city center while the second location in Thi-Qar goverment Al-Gharraf district about 26 km north Nassiryah 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 seeds were cultivated in lines with 6m long and the distance between them was (20 cm) in each experimental plot. The quantity of fertilizer that applied was 100 kg/ha one batch during cultivation while urea fertilizer (46%N) were applied in three batch, first batch was during cultivation, the second after tillers and the third during spikes formation stage (3). Ten Genotypes of soft wheat as in table (2) which illustrates names of Genotypes field symbols and cultivar sources. The studed traits were (plant hight (cm), leaf area (cm^2), Length of spike (cm), Number of tellers /plant, Number of spikes/m^2, Number of seeds/ spike, 100 seed weight (gm), Dry weight (gm/m^2), Seed yield (kg/dounm).

Table (1) physical and chemical characteristics of soil locations

Traits / Location	Texture	PH	EC des/m	Particles%			Minerals%		
				Sand	Laom	Clay	N	K	P
Al-Muthanna*	Salty clay	7.65	4.21	20	39	41	0.70	1.21	0.22
Thi-Qar**	Loauty clay	7.82	3.72	22	43	35	0.65	1.35	0.52

*Data analyzed in Al-mothanna university/agriculture college/ soil & water Lab **Data analyzed in Dhi-qar directorate / soil & water Lab

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) (2).

Table (2) Data of introduced Genotypes in study.

Genotype	IR885	IR899	IR1123	IR981	IR1131	IR969	IR1069	Abu Ghraib	IPA99	FURAT
Code	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10
Source	International Corn & Wheat improvement Centre in Mexico (CIMMYT)/ General body of researches							Certified cultivars from Agriculture Ministry		

Results and discussion

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

Plant height (cm)

The data presented in table (3) indicated that genotypes significantly affected the plant height . Maximum plant height (105.333) cm was observed for W10 genotype, whereas minimum value (78.833) cm was observed for W7 genotype. The reason for that may be due to the genetic nature of genotype , The result is in agreement with(1,16). also the location of study were differed significantly between them in this trait in which Dhi- Qar location, gave the highest rate was (96.400cm), while Muthanna location gave the lowest rate for this trait was (86.300cm) and 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 rate for this trait was (113.333) cm in Thi- Qar location .

Leaf area (cm 2)

The results of table (3) showed that the significant effect of genotypes on leaf area where W9 genotype given highest rate of leaf area (64.617 cm 2) while W6 genotype given lowest rate for this trait (39.917 cm 2) and the reason for this is the difference of genotypes among them in leaf area in addition to the viability among genotypes, this result is in agreement with the findings of the (7), which showed that in order to produce high yield of crop it should produce sufficient leaf area index to intercept the largest amount of light to produce the largest amount of dry matter , also the interaction among W9 genotype in Thi- Qar location recorded the highest

rate for this trait (76.633 cm 2) and the reason for this is due to the interaction effect of environmental and genetic factors .

Length of spike

The results of table (3) showed that the significant effect of genotypes on length of spike where W10 genotype given highest rate of tall spike (17.000 cm) while W5 genotype given lowest rate for this trait (12.167 cm),Where in spite of the variation in the rates of this trait among genotypes, this cannot indicate that the increase in the length of the spike is significant to increase the number of grains / spike and this result is in agreement with the findings of (6). Also Thi- Qar location was superior, giving higher rate for this trait was (14.800 cm), Regarding the interaction of Thi- Qar location and the W10 genotype has given highest rate for this trait was (20.000 cm).

Number of tellers

The results of table (3) showed that the significant effect of genotypes on number of tellers where W1 genotype given highest rate of tall spike (11.333 teller) while W7 genotype given lowest rate for this trait (4.667 teller) and the reason for that is the formation of tellers (branches) depend on cultivar, applied fertilizers, cultivation date and environmental conditions, this result is in agreement with the findings of (4, 19). Also Thi-Qar location was superior to giving highest rate of this trait (8.600 teller) and the reason for that is the nature of the soil and its texture and minerals content.

Table (3) Effect of Genotypes, locations and interaction on Growth traits for Al-Muthanna & Thi-Qar Locations.

Trait	*Cultivar*	*Location*		*Mean Cultivar*
		Al-Mothanna	Dhi-qar	
Plant height (cm)	W1	93.333	96.000	94.667
	W2	88.333	85.000	86.667
	W3	84.000	97.667	90.833
	W4	88.667	92.333	90.500
	W5	82.333	97.333	89.833
	W6	82.333	100.667	91.500
	W7	72.333	85.333	78.833
	W8	94.000	111.667	102.833
	W9	80.333	84.667	82.500
	W10	97.333	113.333	105.333
	Mean locations	86.300	96.400	
	L.S.D (0.05)	Cultivars = 2.74	Locations =1.22	Interactions =3.87
Leaf Area (cm^2)	W1	51.267	49.667	50.467
	W2	48.900	45.133	47.017
	W3	65.233	51.600	58.417
	W4	53.833	54.167	54.000
	W5	52.313	51.933	52.123
	W6	39.000	40.833	39.917
	W7	47.167	48.133	47.650
	W8	53.200	53.200	53.200
	W9	52.600	76.633	64.617
	W10	42.867	57.000	49.933
	Mean locations	50.638	52.830	
	L.S.D (0.05)	Cultivars =6.97	Locations N.S	Interaction =9.86
Spike Tall (cm)	W1	13.667	13.667	13.667
	W2	11.667	14.333	13.000
	W3	16.333	15.000	15.667
	W4	10.667	14.000	12.333
	W5	11.000	13.333	12.167
	W6	11.667	13.333	12.500
	W7	12.000	15.000	13.500
	W8	12.667	15.000	13.833
	W9	12.333	14.333	13.333
	W10	14.000	20.000	17.000
	Mean locations	12.600	14.800	
	L.S.D (0.05)	Cultivars =1.01	Locations =0.45	Interactions =1.43
Tellers No.	W1	10.000	12.667	11.333
	W2	5.333	8.000	6.667
	W3	7.333	7.333	7.333
	W4	8.667	11.667	10.167
	W5	5.000	7.000	6.000
	W6	7.000	9.000	8.000
	W7	4.000	5.333	4.667
	W8	4.333	6.667	5.500
	W9	7.333	10.000	8.667
	W10	5.000	8.333	6.667
	Mean locations	6.400	8.600	

L.S.D (0.05)	Cultivars =1.27	Locations =0.57	Interactions =N.S.

The effect of genotypes and locations in the yield traits

Number of spikes/ m^2

The results of table (4) showed that the significant effect of genotypes on number of spikes/m^2 where W10 genotype given maximum number of spikes (805.333 spike/m^2) while W7 genotype given minimum number for this trait (447.167 spike/m^2) this result is in agreement with the findings of (1, 10) also Thi- Qar location was superior in this trait giving maximum number reach (615.000 spike/m^2).

Number of seeds/ spike

The results of table (4) showed that the significant effect of Number of seeds/ spike where W7 genotype given highest rate of seed (97.000 seed/spike) while W2 genotype given lowest rate for this trait (37.000 seed/spike) this result is in agreement with the findings of (1, 12).

100 seed weight (gm)

The results of table (4) showed that the significant effect of 100 seed weight (gm) where W7 genotype given highest rate (4.918 gm) while W1 genotype given lowest rate for this trait (2.445 gm) may be due to the genetic nature of cultivar in which cultivars differ in Germplasm, this result is in agreement with the findings of (4, 1) also Thi- Qar location was superior in this trait giving highest rate reach (3.725 gm), Regarding the interaction between genotypes and locations W7 genotype gave highest rate for this trait reach (5.020 gm).

Dry weight (gm/m^2)

The results of table (4) showed that the significant effect of Dry weight (gm) where W2 genotype given highest weight (335.833 gm) while W3 genotype given lowest weight for this trait (47.500 gm) also Thi- Qar location was superior to giving highest weight reached (245.700 gm).

Seed yield (kg/dounm)

The results of table (4) showed that the significant effect of Seed yield (kg/dounm) where W4 genotype given highest yield (1868.333 kg/dounm) while W8 genotype given lowest yield for this trait reached (844.323 kg/dounm) may be due to the genetic nature of cultivar in which cultivars differ in Germplasm in seed yield and this result in agreement with (1, 4, 18) also the results showed the significant effect of for locations in this traits in which Thi- Qar location gave highest yield (1244.159 kg/dounm).

Table (4) Effect of genotypes, locations and interaction on Yield and its compenents traits for Al-Mothanna & Thi-Qar Locations

Traits	*Cultivars*	*Locations*		*Mean Cultivars*
		Al-Mothanna	**Dhi-Qar**	
Spikes No./m^2	W1	**497.000**	**514.667**	**505.833**
	W2	**662.667**	**685.333**	**674..000**
	W3	**606.667**	**635.333**	**621.000**
	W4	**641.667**	**646.000**	**643.833**
	W5	**513.333**	**544.667**	**529.000**
	W6	**661.667**	**685.667**	**673.667**
	W7	**433.333**	**461.000**	**447.167**
	W8	**531.000**	**581.667**	**556.333**
	W9	**558.333**	**567.333**	**562.833**
	W10	**782.333**	**828.333**	**805.333**
	Mean Locations	**588.800**	**615.000**	
	L.S.D (0.05)	**Cultivars =21.03**	**Locations =9.40**	**Interactions = N.S.**
Seed No./spike	W1	**73.000**	**76.333**	**74.667**
	W2	**35.000**	**39.000**	**37.000**
	W3	**49.333**	**53.667**	**51.500**
	W4	**66.333**	**68.333**	**67.333**
	W5	**61.000**	**58.000**	**59.500**
	W6	**46.333**	**44.333**	**45.333**
	W7	**82.000**	**76.000**	**79.000**
	W8	**48.667**	**44.667**	**46.667**
	W9	**56.000**	**54.667**	**55.333**
	W10	**48.000**	**45.000**	**46.500**
	Mean Locations	**56.567**	**56.000**	

	L.S.D (0.05)	**Cultivars = 3.98**	**Locations = N.S.**	**Interactions = N.S.**
	W1	**2.410**	**2.480**	**2.445**
	W2	**4.433**	**4.457**	**4.445**
	W3	**4.030**	**4.073**	**4.052**
	W4	**4.343**	**4.283**	**4.313**
100 seed	W5	**4.417**	**4.083**	**4.250**
weight (gm)	W6	**3.200**	**3.273**	**3.237**
	W7	**4.817**	**5.020**	**4.918**
	W8	**3.183**	**3.343**	**3.263**
	W9	**2.767**	**2.827**	**2.797**
	W10	**2.950**	**3.413**	**3.182**
	Mean Locations	**3.655**	**3.725**	
	L.S.D (0.05)	**Cultivars = 2.66**	**Locations = 1.19**	**Interactions = 3.76**
	W1	**208.333**	**243.333**	**225.833**
	W2	**316.667**	**355.000**	**335.833**
Dry weight/m^2	W3	**133.333**	**161.667**	**147.500**
(gm)	W4	**203.333**	**213.333**	**208.333**
	W5	**238.333**	**250.000**	**244.167**
	W6	**290.000**	**306.667**	**298.333**
	W7	**206.667**	**216.667**	**211.667**
	W8	**193.333**	**208.667**	**201.000**
	W9	**245.000**	**286.667**	**265.833**
	W10	**200.000**	**215.000**	**207.500**
	Mean Locations	**223.500**	**245.700**	
	L.S.D (0.05)	**Cultivars =16.27**	**Locations = 7.28**	**Interactions = N.S.**
	W1	**873.857**	**969.323**	**921.590**
	W2	**1027.150**	**1190.000**	**1108.575**
Seed yield	W3	**1203.333**	**1387.667**	**1295.500**
(kg/donum)	W4	**1847.667**	**1889.000**	**1868.333**
	W5	**1383.667**	**1288.333**	**1336.000**
	W6	**981.823**	**994.550**	**988.187**
	W7	**1711.667**	**1758.000**	**1734.833**
	W8	**820.320**	**868.327**	**844.323**
	W9	**863.110**	**876.057**	**869.583**
	W10	**990.067**	**1220.333**	**1105.200**
	Mean Locations	**1170.266**	**1244.159**	
	L.S.D (0.05)	**Cultivars = 98.55**	**Locations = 44.07**	**Interactions = N.S.**

Conclusions and Recommendations:

In conclusion W4 Genotype has given the highest rate of seed yield reached (1868.333) kg / dounm , which shows the appropriate environmental conditions with the nature of genotype as a result led to a superiority in the quantity of yield and also Thi- Qar location was superior to giving highest rate of most of the studied traits (plant height, length of Spike, number of tellers, number of spikes , 100 seed weight, dry weight, and seed yield), while the interaction between the location of Thi- Qar and genotype W7 gave highest rate of 100 seed weight reached (5.020 g), while giving genotype W9 highest rate of leaf area was (76.633 cm 2) and W10 genotype gave highest rate of plant height and spike length was (113.333 cm and 20.000 cm), respectively. So we recommend cultivation W4 genetic due to the superiority of this genotype by giving the highest rate seed yield and the possibility of distributing the cultivation of these genotypes at the Thi- Qar location, because of the superiority of this location most of the studied traits and replant these genotypes at other locations within the study area to reach the stability of genetic and submitted for approval and registration.

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