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EVALUATION OF SOME BREAD WHEAT (*TRITICUM AESTIVUM*) GENOTYPES UNDER NORMAL AND REDUCED IRRIGATION REGIMES

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ABSTRACT: *Field trial was conducted at Sakha Agricultural Research Station, Field Crop Institute, ARC in 2008-2009 and 2009-2010. The objective was to study the effect of two water treatments, i e, normal and stress irrigation on wheat grain yield and its components and some agronomic traits of sixteen bread wheat genotypes. The trail was in two separate irrigation treatments. Randomized complete block designs in three replications was used for this investigation. The first experiment was given only one surface-irrigation after 25 days from planting irrigation (S) while, the second treatment was irrigated four times after planting irrigation (N). Measurements were taken on days to heading, days to maturity, plant height, number of spikes* m^{-2}*, number of kernels per spike, 1000-kernel weight (gm)and grain yield. The drought susceptibility index was calculated. The results revealed that one irrigation (stress) reduced significantly plant height in both seasons, number of spikes* m^{-2}*, kernels per spike and grain yield in the first season. Normal irrigation caused positive increases of yield and its components. Highly significant genotype differences occurred for all characters under studies in both seasons except grain yield in the first season. Line(7) recorded the earliest genotype in heading and maturity days in both seasons. Line (12) and (9) recorded the tallest plants in the first and second seasons respectively. Line (1) was recorded the highest number of spikes* m^{-2} *in the first season. Line (10) and Sids 12 recorded the highest number of kernels/spike in the first and second seasons, respectively. while Line (9) recorded the heaviest 1000 kernel weight in both seasons. Line (9) recorded the highest grain yield in the second season followed by Sids 12. The results indicated that Sakha 93,Sids 12 and Line 1 are more tolerant than the other genotypes under stress conditions.*

Key word: *Wheat, irrigation, genotypes, yield , drought susceptibility index.*

INTRODUCTION

Bread wheat *Triticum aestivum L.* is the most important cereal crop in Egypt as well as in the world. The annual consumption of wheat grains in Egypt is about 12 to14 million tons, while the annual local production is about 8 million tons in 2012/ 2013*. Efforts of scientists to minimize the gap between local consumption and local production are directed towards two approaches, i.e.; expanding the cultivated wheat area and increasing wheat productivity. The major limitation for agriculture nowadays is the shortage of freshwater resources. Therefore, the main challenge is to maintain crop production without impairing the balance of good quality water. Water stress is the most significant environmental stress in agriculture worldwide. Improving yield under drought is a major goal of plant breeders. Irrigation water could be considered a limiting factor for potential wheat production. So, reducing amount of utilized water might maximize the effecincy available irrigation water. Abiotic stress defined as any change in environmental conditions that might reduce or adversely affect plant growth or development. Among the abiotic environmental stresses, drought remains one of the most important factors threatening the food security of people throughout the world (Farshedfar *et al.,*

* Central Administration of Economics, Ministry of Agriculture and Land Recrimination, Egypt, 2012/2013.

1995). Drought tolerance refers to ability of genotype to remain relatively more productive than others under limited water condition. Many researchers have proven the importance of irrigation treatmenc to maximize wheat productivity, Menshawy *et al.* (2006) studied the effect of reduced number of irrigations on four bread wheat genotypes. The results indicated that, decreasing the number of irrigation decreased the means of days to heading, days to maturity, plant height, kernels/spike, 1000-kernel weight, grain and straw yields for all genotypes. Abdel-Moneam and Sultan (2009) evaluated 15 genotypes of bread wheat for drought tolerance. The results indicated that, all studied traits had significantly decreased by drought treatment. Sharshar (2010) reported that stress and normal irrigation treatments were highly significantly effected number of days to heading, maturity, plant height, number of spikes m^{-2}, 100 kernel weigh, number of kernels/spike and grain yield/plant.

The main objectives of this study were to; (1) compare the response of agronomic traits of 16 spring wheat genotypes under normal and reduced irrigation and (2) identify genotypes with high yield potential under reduced irrigation.

MATERIALS AND METHODS

1- Field experiments:

The field experiments were carried out during 2008/09 and 2009/10 wheat growing seasons at the experimental farm of Sakha Agricultural Research Station (clay soil), Kafer El-Sheikh, Egypt. The plant materials for the study comprised 16 bread wheat genotypes (thirteen promising lines and three commercial cultivars). Names and pedigrees of these genotypes are shown in Table 1.

The experiment was carried out in a randomized complete block design with three replications two irrigation regime were applied. (1) Normal irrigation (five irrigations) as recommended for wheat crop in the region and (2) Water stress: One irrigation was given at tillering stage (25 days after planting irrigation).

Seeds were drilled at a density of 350 seeds m^{-2} based on 1000-kernel weight. Each genotype was planted in six rows of 3.5 meters length spaced 20 cm apart. Thus, the area of each plot was 4.2 m^2. Recommended dose of fertilizers was applied at the time of sowing in 25th, November in both seasons. A wide border (7m) was used to minimize the infiltration of water permeability surrounded each experiment.

In both seasons, measurements were taken on days to heading, days to maturity, plant height, number of spikes m^{-2}, number of kernels $spike^{-1}$, 1000-kernel weight and grain yield. Grain yield was estimated from the four central rows to eliminate the border effect of each plot values converted to Ardab / Faddan (Ardab = 150Kg) before analysis. The drought susceptibility index (DSI) was used as a measure of drought tolerance in terms of minimization of the reduction in yield caused by unfavorable versus favorable environments.

The amount of applied irrigation water, rainfall and seasonal water applied in each of the two irrigation treatments in the two seasons were measured and is shown in Table 2

The meteorological data for 2008/2009 and 2009/2010 winter seasons were given in Table 3.

DSI was calculated for each genotype according to the formulae of Fisher and Maurer (1978):

DSI = $(1 - y_d/y_p)/D$. Where; yd = mean yield in drought environment, Y_p= mean yield in normal condition = potential yield, D = drought stress intensity = 1 - (mean y_d of all genotypes / mean y_p of all genotypes).

Table 1 Name , Cross and pedigree of sixteen wheat genotypes

Genotypes	Cross Name & Pedigree
Line 1	SAKHA 93 / SAKHA 94 S. 15632-22S-3S-1S -0S
Line 2	SAKHA 94 / GIZA 168 S. 15636-4S-2S-1S -0S
Line 3	GEMMIZA 10/SAKHA 94 S. 15651-18S-1S-2S -0S
Line 4	GEMMIZA 10/SAKHA 94 S. 15651-20S-1S-1S -0S
Line 5	SHI # 4414 / CROW "S" // GIZA 163 /3/ SAKHA 94 S. 15660-6S-1S-2S -0S
Line 6	ATTILA /SAKHA 94 S. 15673-10S-1S-2S -0S
Line 7	SAKHA 3 /7/ CNO"s"/ GLL/3/ SON 64/ KLRE // BB/4/ UP 301/5/ TL//FN.TH/2*NAR 59 /6/ (BB*CNO**CNO* TOTA/JAR) 2F5 / 2F2** (IN*TGLR**CNO"s"*PJ 62* JAR"S")2F1 /8/ SAKHA 12 /5/ KVZ // CNO 67 / PJ 62 /3/ YD "S" / BLO "S" /4/ K 134 (60) / VEE S. 15713-5S-2S-1S -0S
Line 8	D 6301/ HEINEVII // ERA /3/ BUC/4/ LIRA /5/ SPB /6/ GIZA 144// PJN"s"/ BOW"s" /8/ BL1133/3/ CMH 79A.955*2/ CNO 79// CMH 79A.955 / BOW"s" /7/ CNO "s" / GLL /3/ SON 64 / KLRE // BB /4/ UP 301 /5/ TL // FN. TH /2* NAR 59 /6/ (B6 * CON ** CON * TOTA / JAR) S. 15734-3S-4S-2S -0S
Line 9	WBLL1*2/BRAMBLING CGSS01B00062T-099Y-099M-099M-099Y-099M-62Y-0B
Line 10	WBLL1*2/BRAMBLING CGSS01B00062T-099Y-099M-099M-099Y-099M-87Y-0B
Line 11	WBLL1*2/KKTSCGSS01Y00050T-099M-099Y-099M-099M-37Y-0B
Line 12	WBLL1*2/TUKURU CGSS00B00161T-099TOPY-099M-099Y-099M-099M-16Y-0B
Line 13	KAUZ//ALTAR84/AOS/3/PASTOR/4/TILHI CMSS97M03915T-040Y-020Y-030M-020Y-040M-12Y-1M-0Y
Sakha 93	Sakha 92/ TR 810328 S 8871-1S-2S-1S-0S
Giza 168	Mrl / Buc // Seri CM 93046-8M-0Y-0M-2Y-0B
Sids 12	BUC//7C/ALD/5/MAYA74/ON//1160.147/3/BB/GLL/4/CHAT"S"/6/ MAYA/VUL//CMH74A.630/4*SX SD7096-4SD-1SD-1SD-0SD

Table 2. Amount of applied irrigation water, total rainfall and seasonal water applied delivered to each irrigation treatment during the two growing seasons, 2008/09 and 2009/10.

Treatment	Season			
	2008/09		2009/10	
	normal	stress	normal	stress
Irrigation water (m^3 $fed.^{-1}$)	2015.5	845.5	2050.1	848.6
Total rainfall (m^3 $fed.^{-1}$)	142.8	142.8	117.6	117.6
Seasonal Water applied (m^3 $fed.^{-1}$)	2158.3	1088.3	2167.7	966.2

Table (3): Monthly mean of maximum (max) and minimum (min) air temperature (AT ^oC), mean relative humidity (RH%) and rainfall (mm/month) in 2008/2009 and 2009/2010 seasons.*

	Season							
	2008/2009				2009/2010			
	AT oC		RH%	Rainfall	AT oC		RH%	Rainfall
Month	Max	Min		(mm)	Max	Min		(mm)
Nov.	26.00	8.30	67.58	0.5	25.11	10.32	64.72	0.0
Dec.	22.35	7.08	67.65	17.5	22.72	8.92	66.44	5.8
Jan.	20.57	7.07	67.05	3.5	21.77	7.77	71.48	0.0
Feb.	21.14	7.28	64.88	12.5	23.38	9.19	65.11	22.2
Mar.	22.34	7.13	65.54	0.0	23.92	9.18	62.09	0.0
Apr.	27.15	11.00	62.65	0.0	28.77	11.76	68.62	0.0
May	29.63	13.12	60.69	0.0	30.26	15.43	57.88	0.0

Max = maximum and Min = minimum Based on Sakha meteorological station data
*Mgro meteorological data climatic factor from Sakha Station, (A.R.C).

2-Statistical analysis:

The collected data for all variables in the two seasons were statistically analyzed by "MSTATC" microcomputer program (MSTATC, 1990) via analysis of variance using randomized complete block, one factor model, combined over year and irrigation treatments according to Gomez and Gomez (1984). All factors except replication and years were considered fixed. The means of irrigation regime and genotypes were obtained and differences were assessed with LSD at test 5% level of probability.

RESULTS AND DISCUSSIONS

Analysis of variance showed significant or highly significant variations due to years for all characters, therefore, the results are discussed in each year.

Earliness characters and plant height

The data in Table (4) indicated that the effect of irrigation treatments on days to heading and days to maturity were insignificant in both seasons. On the other hand, irrigation effects were highly significant for plant height in both season. Insignificant differences in days to heading and maturity might be due to the effect of low temperatures during the period of vegetative stage, which minimize the effect of reduced irrigation. Ghodsi (2004) have reported that one of the major effects of water stress is to decrease plant height, which also caused a reduction in dry matter accumulation and subsequently plant height reduction These results are in harmony with those reported by Abd El-Hamid (2013). General results indicated that reduced irrigation resulted in early to heading, maturity and short plants in both growing seasons.

Table (4). Effect of irrigation treatments (Normal and stress), genotypes and their interaction on days to heading, days to maturity and plant height in two seasons(2008/2009-2009/2010).

Treatment	Days to heading		Days to maturity		Plant height	
	2008/09	2009/10	2008/09	2009/10	2008/09	2009/10
irrigation (I)						
Normal	94.00	90.6	143.9	141.5	114.9	104.2
stress	92.70	88.6	142.6	139.0	107.7	98.2
F test	N S	N S	N S	N S	* *	**
Genotypes(G)						
Line 1	93.2	91.5	146.2	141.3	102.4	93.3
Line 2	83.0	83.3	140.7	139.7	103.4	90.7
Line 3	99.2	94.8	144.0	139.0	111.9	101.7
Line 4	93.2	89.2	142.2	140.0	102.5	95.8
Line 5	100.7	97.0	145.7	140.5	115.0	106.7
Line 6	97.0	92.7	144.7	140.3	106.7	101.7
Line 7	80.7	80.2	137.5	133.7	100.8	95.8
Line 8	88.8	83.8	141.5	141.0	106.6	104.7
Line 9	95.5	89.9	144.2	142.2	124.2	113.3
Line 10	97.0	90.0	145.8	142.7	122.5	109.2
Line 11	95.5	93.7	142.8	143.7	119.2	114.2
Line 12	99.7	90.2	147.2	137.8	125.9	105.0
Line 13	92.5	86.9	141.3	141.5	117.5	90.8
Sakha 93	97.7	92.9	143.7	139.2	104.0	98.0
Giza 168	91.7	90.3	144.5	142.8	111.5	98.4
Sids 12	88.2	87.0	140.3	138.7	107.5	99.2
F test	* *	* *	* *	* *	* *	* *
LSD 0.05	1.3	2.0	1.8	3.0	4.6	4.0
Interaction IxG						
F test	* *	* *	* *	*	* *	N S

Significant differences among genotypes were observed for the three characters . Line (7) was the earliest genotype in days to heading and days to maturity in both seasons. These variations among genotypes might reflect, partially, their different genetic backgrounds. Similar results were observed by Gab-Alla (2007).

As for plant height, line (1) and line (2) were the shortest genotypes in the first and second seasons respectively, while, Line(12) and Line(11) were the tallest genotypes in the first and second seasons, respectively.

Data in Table (5) illustrated highly significant differenees due to the interaction between irrigation treatments and genotypes for days to heading and maturity in the two seasons while it was highly significant for plant height in the first season.

Table (5). Effect of interaction between irrigation treatments and genotypes on days to heading and maturity and plant height.

Treatment	Days to heading				Days to maturity				Plant height	
	2008/09		2009/10		2008/09		2009/10		2008/09	
genotypes	N	S	N	S	N	S	N	S	N	S
Line 1	93.7	92.7	92.3	90.7	147.8	144.5	141.7	141.0	103.0	101.7
Line 2	84.7	81.3	84.0	82.6	141.3	140.0	140.7	138.7	105.7	101.0
Line 3	101.7	97.7	96.6	93.0	145.0	143.0	142.0	136.0	115.0	108.7
Line 4	93.7	92.7	89.7	88.7	143.0	141.3	140.7	139.3	105.0	100.0
Line 5	101.0	100.3	97.3	96.7	147.0	144.3	141.3	139.7	118.3	111.7
Line 6	97.7	96.3	93.0	92.4	145.0	144.3	141.0	139.7	108.3	105.0
Line 7	83.0	78.3	82.0	78.3	137.8	137.2	135.7	131.7	103.3	98.3
Line 8	85.7	82.0	85.5	82.0	142.0	141.0	141.7	140.3	108.3	105.0
Line 9	95.7	95.3	91.0	88.7	144.0	144.3	144.5	139.9	130.7	117.7
Line 10	97.7	96.3	90.7	89.3	146.5	145.0	143.3	142.0	128.3	116.7
Line 11	95.7	95.3	94.3	93.0	140.5	145.0	144.7	142.7	126.7	111.7
Line 12	100.3	99.0	90.7	89.7	148.0	146.3	138.0	137.5	130.0	121.7
Line 13	93.7	91.3	87.7	86.0	143.0	139.6	142.0	141.0	125.0	110.0
Sakha 93	99.3	96.0	94.7	91.0	144.3	143.0	141.7	136.7	108.0	100.0
Giza 168	92.0	91.3	91.3	89.3	145.2	143.8	144.5	141.2	115.0	108.0
Sids 12	89.0	87.3	88.0	86.0	141.8	138.7	140.7	136.7	108.3	106.7
LSD 0.05	1.8		2.9		2.5		3.7		5.7	

Based on results in Table 5, the genotypes responded differently to irrigation treatments. Line 7 was the earliest genotype for days to heading under normal and stress irrigation treatments in the two seasons while, line 5 was the latest under normal and stress irrigation treatments in both seasons. Therefore, the significant interaction between genotype and irrigation treatments in days to heading might due to the different responses of these genotypes (Table 5). Line (7) was among the earliest genotype in maturity under normal and stress irrigation treatment. While Line (12) and Line (11) were among the latest genotypes under normal and stress irrigation treatment in the first and second seasons, respectively. These results indicated that, the earliest heading genotype might not be always the earliest in maturity. Therefore, evaluation of maturity earliness based on heading date may be misleading.

The effects of irrigation treatment and genotype x irrigation interaction on plant height in the first season present in Table 5. Decreased in plant height was observed in most studied genotypes due to reducing the amount of irrigation water. The decrease in plant height was more pronounced in Lines (9), (10), (11), and (13). The decrease in plant height in response to water may be due to the decrease in relative turgidity and dehydration of protoplasm, which is associated with a loss of turgor and reduced expansion of cell and cell division. EL-Hag (2011) reported the decrease in plant height due to water stress. Line one and seven were the shortest genotype under normal and stress irrigation.

Grain yield and its components

Grain yield and its components were affected highly significantly affected by irrigation treatments in the first season. Meanwhile, the number of spikes m^2 in both seasons (Table 6).

Number of spikes / m^2, kernels/spike, grain yield and 1000-kernel weight in the first season were of higher values under normal compared to stress irrigation treatment. Farahat (2005) reported that, mean of 1000-kernel weight for all genotypes under water stress condition were insignificantly higher than normal condition.

On contrary, some workers explained the decrease in grain weight under drought condition by a reduced grain fertility period and /or reduction in photosynthesis and translocation of reserves to grains (Menshawy and Hagras, 2008).

The results in Table (6) show that, grain yield under normal irrigation treatment was significantly higher than under stress irrigation in the first season.

The differences among genotypes in grain yield were significant only in the second season. Lines 2, 3, 4, 6, 8, 9, Sakha 93 and Sids12 were among the highest grain yield (24.1 ard./fed.). Grain yield of these Lines had attributed to the increase in yield components values such as number of spikes/m^2, number of grains/spike and 1000-kernel weight. These results are in agreement with those obtained by Tahmasebi *et al.* (2007), EL-Samahy (2009).

The interaction effects between genotypes and irrigation treatments were highly significant for number of spikes m^{-2} and number of kernels per spike, only in the first season (Table 7). Line 1 recorded the highest number of spikes m^{-2} under normal irrigation. While, Giza 168 and Line1 recorded the highest number of spikes m^{-2} under stress irrigation. On the other hand, Line 11 was among the lowest genotypes number of spikes m^{-2} under normal and stress irrigation. Sids 12 recorded the highest number of kernels/spike under normal and stress irrigation (72.5 and 68.5). However, kernels per spike of the genotypes responded differently for these traits (Table 7).

The drought susceptibility index (DSI) was calculated on the basis of the average two season. The results indicated that Sakha 93,Sids 12 and Line 1 were more tolerant under stress conditions and might be involved in breeding programs to develop water stress tolerant wheat genotypes.

Table (6): Effect of irrigation treatments, genotypes and their interaction on grain yield and its components in 2008/09 and 2009/10 seasons.

Treatment	Spikes m^{-2}		No Kernels/ spike^{-1}		1000-Kernel weight		Gain yield Ardab / Faddan	
	2008/09	2009/10	2008/09	2009/10	2008/09	2009/10	2008/09	2009/10
irrigation(I)								
Normal	323.0	320.2	59.5	72.2	47.0	45.4	25.6	22.0
stress	292.7	276.0	57.6	62.3	49.3	47.8	23.4	21.2
F test	* *	* *	* *	N S	**	N S	**	N S
Genotypes(G)								
Line 1	371.5	289.3	58.8	73.2	44.4	41.7	25.4	21.3
Line 2	273.7	323.3	58.2	64.0	52.5	45.7	24.3	22.3
Line 3	313.4	312.0	54.9	64.2	45.6	47.7	24.4	22.3
Line 4	273.9	255.7	58.0	72.5	43.5	42.4	25.4	22.4
Line 5	299.0	302.0	52.9	62.0	43.8	41.8	24.3	18.8
Line 6	292.5	320.0	51.8	59.2	44.5	45.3	24.8	22.3
Line 7	278.0	316.0	56.1	55.7	56.6	52.0	23.6	19.2
Line 8	286.7	256.7	63.3	72.6	54.0	54.1	24.9	22.3
Line 9	345.4	315.3	60.4	63.9	56.9	55.1	25.2	24.1
Line 10	356.1	259.0	63.4	75.0	50.8	51.3	23.8	20.6
Line 11	256.0	273.3	57.4	66.2	48.6	50.1	24.1	21.3
Line 12	266.0	321.7	59.5	67.0	51.9	48.4	25.8	20.8
Line 13	298.7	314.7	54.4	62.7	46.1	43.4	25.2	21.2
Sakha 93	336.0	319.7	54.4	65.4	44.4	43.4	23.6	22.4
Giza 168	365.4	295.7	57.0	73.0	41.1	40.9	23.7	21.5
Sids 12	313.4	295.0	62.5	79.4	45.7	42.1	24.6	23.3
F test	* *	* *	* *	* *	* *	* *	N S	*
LSD 0.05	13.1	29.5	2.8	7.5	1.0	3.8	-	2.7
Interaction IxG								
F test	* *	NS	* *	N S	N S	N S	N S	N S

Table (7): Effect of interaction between irrigation treatments and genotypes on Spikes m^{-2}, Kernels $spike^{-1}$ in the first season and drought susceptibility index (DSI) in average two season.

Treatment	Spikes/ m^{-2}		Kernels $spike^{-1}$		
	2008/09		2008/09		
genotypes	N	S	N	S	DSI
Line 1	399.7	343.3	55.7	46.7	0.36
Line 2	284.7	262.7	53.0	45.9	0.48
Line 3	315.0	311.7	68.5	53.3	0.69
Line 4	286.3	261.5	71.3	64.6	0.66
Line 5	357.2	240.7	57.2	60.5	0.39
Line 6	305.7	279.3	46.2	44.7	0.64
Line 7	300.2	255.7	48.0	46.1	0.65
Line 8	304.0	269.3	47.2	53.6	0.52
Line 9	351.7	339.0	53.7	58.3	1.00
Line 10	371.0	341.2	56.9	59.6	0.49
Line 11	276.0	236.0	62.5	65.9	0.62
Line 12	281.0	251.0	63.2	62.0	0.53
Line 13	298.7	298.7	65.2	61.4	0.43
Sakha 93	346.7	325.3	66.0	67.0	0.33
Giza 168	371.7	359.0	65.3	63.3	0.60
Sids 12	317.7	309.0	72.5	68.5	0.34
LSD 0.05	18.5		3.9		

In conclusion, Line 7 was the earliest Line in the two seasons and could be used in wheat breeding for earliness. Meanwhile, Line 9 produce the highest grain yield in the two seasons, however, the increase in the grain yield was significant in the second season only. Therefore Line 9 could be used in wheat breeding program to develop new high yielding cultivars.

REFERENCES

Abd El-Hamid, E.A.M. (2013). Genetic analysis of some bread wheat crosses under normal and water stress conditions. the 8[Th] Plant Breeding International Conference, Kafr El Sheikh, Egypt 14- 15May: .

Abd EL-Moneam, M. A. and M.S. Sultan (2009). Performance of some bread wheat genotypes and its genetic parameters under irrigation and drought conditions. the 6Th International Plant Breeding Conference, Ismalia, Egypt 3-5May: 204-219.

Central Administration of Economics, Ministry of Agriculture and Land Recrimination, Egypt, 2012/2013.

EL-Hag, Walaa A. (2011). Evaluation of some cultivars and lines of bread wheat under low input M.Sc. Thesis, Kafr EL-Sheikh Univ., Egypt.

EL-Samahy; Basma E.M (2009). Effect of nitrogen, potassium fertilizer on yield and component some wheat genotypes M.Sc. Thesis, Kafrelsheikh Univ., Egypt.

Farahat, W.Z.E. (2005). Genetical studies on drought tolerance in bread wheat (*Triticum aestivum* L) M. Sc Thesis, Tanta Univ. Egypt.

Farshedfar, E., B. Koszegi, T.Tischner and J. Sutka (1995). Substitution analysis of drought tolerance in wheat (*Triticum aestivum* L.). Plant Breeding, 114:542-544.

Fisher, R.A. and R. Maurer (1978). Drought resistance in spring wheat cultivars. I. Grain yield responses. Aust. J. Agric. Res., 29: 897-912.

Gab-Alla, M. M. M. (2007). Effect of irrigation numbers on some varieties and strains of wheat. M. Sc Thesis, Kafrelsheikh Univ. Egypt.

Ghodsi, M. (2004). Ecophsiological aspects of water deficit on growth and development of wheat cultivars Ph. D. Dissertation, University of Tehran, Iran.

Gomez, K.A. and A.A. Gomez (1984). Statistical procedures for agriculture research. John Wiley & Sons, New York: Wiley-Interscience.

Menshawy, A.M.M. and A.A.I. Hagras (2008). Evaluation of some bread wheat genotypes under normal and reduced irrigation. The First International Conference On Environmental Studies and Research (Natural Resources & Sustainable Development), Environmental Studies and Research Institute (ESRI), Minufiya University – Sadat Branch, Egypt, 7 – 9 April 2008, pp. 312-323.

Menshawy, A.M.M., A.A. EL-Hag and A. Soaad EL-Sayed (2006). Evaluation of some agronomic and quality traits for some wheat cultivars under different irrigation treatments. The First Field Crops Res. Ins. Conference, 22-24 Aug., Giza, Egypt, 294-310.

MSTATC, (1990). A Microcomputer program for the Design. Management, and Analysis of Agronomic Research Experiments. Michigan State Univ.

Sharshar, A. M. (2010). combining ability and heterosis for bread wheat under stress and normal irrigation treatments. Msc. Agr. Sci Kafrelsheikh Unv.

Tahmasebi, S., M. Khodambashi and A. Rezai (2007). Estimation of genetic parameters for grain yield and related traits in wheat using diallel analysis under optimum and moisture stress conditions. J. Sci. & Technol. Agric. & Natur. Resour., 11(1A): 241.

تقييم بعض التراكيب الوراثية من قمح الخبز تحت الري العادي و المنخفض

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الملخص العربى

أجريت تجربة حقلية فى محطة البحوث الزراعية بسخا، معهد المحاصيل الحقلية بمركز البحوث الزراعية فى موسمى ٢٠٠٨-٢٠٠٩ و ٢٠٠٩-٢٠١٠ بهدف دراسة تأثير معاملات الرى (أربعة ريات – ورية واحدة بعد خمس وعشرون يوما من الزراعة) على المحصول ومكوناتة وبعض الصفات الزراعية لستة عشر تركيب وراثى. وقد أستخدم تصميم قطاعت كاملة العشوائية فى تنفيذ التجربتين . وتم اخذ القياسات التالية عدد الايام حتى طرد السنابل(يوم) وعدد الايام حتى النضج الفسيولوجى (يوم) ، طول النبات(سم) ، عدد السنابل فى المتر المربع ،عدد حبوب السنبلة، وزن الالف حبة (جم) ومحصول الحبوب. وكذلك تم حساب معامل الحساسية لنقص الرى على المحصول. وأوضحت النتائج ان ريه واحدة أدت الى نقص فى كل من طول النبات فى الموسمين ، عدد السنابل فى المتر المربع، عدد حبوب السنبلة، ومحصول الحبوب فى السنة الأولى. الرى العادى أدى الى زيادة معظم صفات المحصول ومكوناتة وأختلفت التراكيب الوراثية فيما بينها فى كل الصفات تحت الدراسة فى الموسمين ما عدا محصول الحبوب فى الموسم الأول . السلالة رقم (٧) كانت ابكر السلالات فى صفتى طرد السنابل والنضج، والسلالة رقم (١٢) و(٩) سجلت أطول السلالات فى الموسم الأول والثانى على التوالى. سجلت السلالة (١) اكثر عدد سنابل فى المتر المربع فى الموسم الاول. وسجل سلالة (١٠) والصنف سدس ١٢ اكثر عدد حبوب/سنبلة فى الموسم الأول الثانى على التوالى. بينما سجلت السلالة (٩) اثقل وزن الف حبة فى الموسمين وكذلك اعلى محصول حبوب فى الموسم الثانى ثم تبعها الصنف سدس ١٢ وكانت اكثر التراكيب الوراثية تحملا للجفاف سخا ٩٣ سدس ١٢ وسلالة رقم (١).