Effect of Supplementary Irrigation and Bio-Fertilization on Wheat Yield Productivity under Rainfed Conditions

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ABSTRACT

Two field experiments were carried out during the two successive growing seasons (2006/2007 and 2007/2008) at El-Hammam farm, Marsa Matrouh, North Western Coast of Egypt, to study the effect of supplementary irrigation schedule depth (mm) and bio-fertilization on wheat yield productivity.

The study included two regimes of bio-fertilizers (without bio-fertilization and bio-fertilization with Microbein as Pseudomonnas sp., Azotobacter sp., Azospirillum sp. and B. megaterium) and four irrigation schedule depth (mm) (without supplementary irrigation(rainfed), supplementary irrigation by 60 mm/fed, supplementary irrigation by 90 mm/fed and supplementary irrigation by 120 mm/fed), all under rainfed conditions.

The obtained results could be summarized as follow:

1-The measurement yield and its components i.e., plant height, number of tillers per plant, number of tillers/m2, number of spikes/m2, spike length, number of spikeletes/spike, number of grain/spike, biological, grain and, straw yields,1000-grain weight; and tillering index were significantly increased by adding bio-fertilizer compored to the control.

2-Adding 120 mm/fed., as an irrigation depth, gave the highest values markedly for plant height, number of tillesr/plant, number of tillers/m2, number of spikes/m2 spike length, number of spikelet/spike, number of grains/spike, biological, grain, straw yields,1000-grain weight, and tillering index.

3-Concerning the effect of interaction between the two factor, bio fertilizer and supplementary irrigation with 120mm/fed gave the highest values for some characters umder study i.e; number of tillers per plant, number of tillers/m2, number of spike/m2 ,number of grain/spike, biological, grain and straw yields, and tillering index, which were significant in both seasons, while there insignificant differences for plant height and spike length, W.U.E. and number of spikelet /spike

Generally, it can be concluded that cultivation the bio-fertilized wheat c.v shaka 93 at El-Hammam farm at North Western Coast of Egybt gave high yield and yield characters under rainfall conditions or with supplementary irrigation or 120 mm/fed. at North Western Coast of Egypt.

Key words: Wheat (*Triticum aestivum L.*), bio-fertilization, supplementary irrigation, yield and yield components.

INTRODUCTION

Despite of the enormous attempts that have been carried out to increase wheat production in Egypt, the gap between production and consumption of wheat grains is still vast. So, increasing wheat production by increasing the productivity per unit area or by enhancing the total cultivated area with wheat became an important national goal.

Chances of increasing wheat production in irrigated areas are limited because;areas assigned to wheat production are small compared to the increase in human population. Second, the severe water shortage in supplying required extension of agriculture and adding new reclaimed areas from the Egyptian desert (about 96% of the area in Egypt is either desert or arid lands).

For solving the second problem, it is necessary to cultivate wheat under rainfed and/or supplementary irrigation conditions especially in the Northern Coast of Egypt. The rainfed areas cover about one million hectares in the North Western Coastal zone of Egypt (with 500 km long and 20 km width). The rainfall in the growing season is highly variable and less than wheat water requirements, consequently conservation is essential to stabilize the water availability for maximum crop production and increase yields (Salem et al., 2003).

The problem tends to take a different aspect in Egypt Although the river Nile provides Egypt with the majority of its needs of fresh water, still the desert comprise more than 90% of the total area; hence, the decision makers planned to install some great canals to convey the Nile water to El-Hammam, which is extends from Baheg canal, which is a branch from El-Nobaria El-Hammam canal was designed to support the rainfed agriculture with supplementary irrigation to get an improve yield.

Wheat plant (*Triticum aestivum L.,)* is the world's major source of calories and protein. It constitutes more than 50% of the human daily meals in the developing countries and not less than 20% of the daily food for human, in the well-developed

countries. Moreover, it's a very good source for animals and birds feeding as well. There aer much e variation. in the level of wheat grain yield throughout the world, largely due to much differences between regions in available water and evaporative demands for that water.

Irrigation is an obvious way increasing yields in those regions, which regularly suffer drought, but lack of fresh water and/or the cost of its application generally restrict the amount of irrigation wheat.

Bio-fertilizers are good source of nutrients and increase organic matter in the soil. They may not only activate N2-fixation but also growth and production, yield level as well as production of the growth regulators such as auxin, cytokinine, gibberellins,…etc., that increase the grain yield (*El-Kased et al., 1996).* In wheat the integrated approach of nutrient supply by chemical fertilizers along with bio-fertilizers is gaining importance because this system not only reduces the use of inorganic fertilizers but also is an environment friendly approach. Bio-fertilizer technology is practiced for increasing agricultural production, to limit the use of chemical fertilizers and pollution of environment through seed inoculation by different types of bacteria (*Abd El Ghany, 1994*). The present investigation was designed to study the effect of supplementary irrigation and bio-fertilizer on wheat productivity under rainfed conditions at the North Western Coast of Egypt.

MATERIALS AND METHODS

1. Site description and soil

Tow field experiments were carried out at El-Hammam region, long about 70km west of Alexandria city,Matrouh Governorate, North Western Coast of Egypt, during the two growing seasons (2006-2007 and 2007/2008) to study the effect of supplementary irrigation schedule depth (mm), and bio-fertilizer application on wheat crop productivity.

1.1.Meteorological data

The meteorological data of temperature, dew point, relative humidity, and rainfall precipitation, obtained from Egypt ion Meteorological Authority, Agricultural Research Center during the two growing seasons of (2006-2007and 2007-2008) are shown in Table (1) for the experiments site (EL-Hammam area, Matrouh)

Concerning the rain fall distribution (mm) in 2006-2007 and 2007-2008 growing seasons, the amounts of rain fall precipitated were 99.5and 98.9mm in the winter seasons of the 1stnd 2nd seasons respectively.

2. Soil analysis

Collected soil samples for this study were air-dried. Particle size analysis (dry sieving) were accomplished according to Jackson (1967). Then, soil samples crushed and sieved through 2mm sieve. Soil samples were analyzed for chemical properties: pH, Electtrial conducivily (salinity) "EC" cationic and anionic compositions according to the methods described by Jackson (1963), while total carbonates were determined by the method of Piper (1950).

Particle size analysis and chemical soil properties are represented in Tables (2 and 3).The data suggest the soil to be of sandy loam texture, with content of CaCO3 (34.8-41.2%). The EC of this soil type ranged between 0.50 and 3.0 mm Mos/cm

Table 1: Meteorological parameters of the experimental site (El –Hammam area, Matrouh) during the two studied seasons.(2006/2007and2007/2008)

Month	Temp.in.C			Dew point (mm)			Humidity (%)		P(mm)
	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	
2006/2007									
Nov.	16.7	20.1	18.4	8.3	11.2	9.75	50.3	63.71	6.8
Dec.	12.3	15.6	13.95	5.0	10.8	7.9	54.7	67.7	29.8
Jan.	10.5	18.2	14.35	4.1	10.4	7.25	59.7	69.7	19.6
Feb.	10.6	18.5	14.55	5.1	11.7	8.4	57.0	69.7	32.5
March	12.0	20.9	16.45	5.9	12.4	9.15	58.7	67.0	5.3
April	13.7	20.8	17.25	9.0	12.9	10.95	49.0	68.7	5.5
May	17.6	26.0	21.8	7.3	17.3	12.3	59.3	68.7	0.0
2007/2008									
Nov.	13.9	24.6	19.25	7.2	15.6	11.4	55.0	63.0	21
Dec.	10.7	20.2	15.45	6.3	11.1	8.7	53.3	64.0	7.9
Jan.	10.1	17.1	13.6	7.2	9.9	8.55	63.7	78.2	35
Feb.	9.6	17.2	13.4	6.1	8.9	7.5	16.9	76.2	24
March	12.4	23.0	17.7	5.5	11.4	8.45	57.7	75.2	10
April	14.0	24.3	19.15	7.0	12.4	9.7	53.0	70.4	1
May	16.2	25.5	20.85	11.9	15.7	13.8	56.4	71.7	0.0

Source: Egyptian Meteorological Authority ,Cairo, Egypt

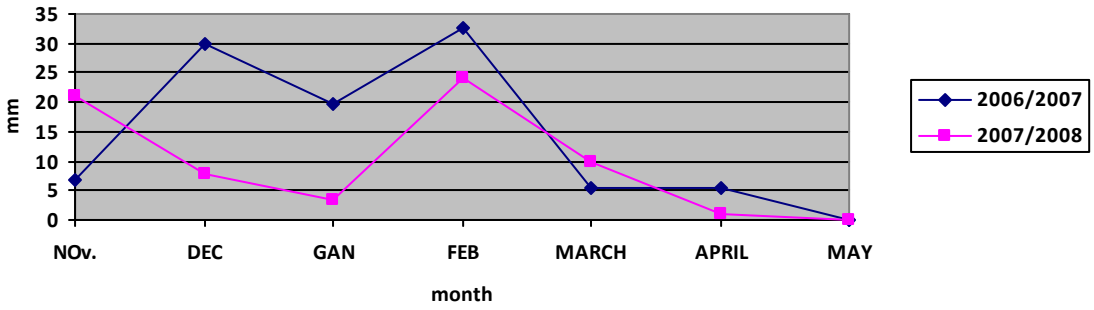

Fig. 1. Distribution of the rainfall in the two growing seasons

Table 2: Some Physical characteristics of soil atEl-Hammam experimental farm during the growing seasons(2006/2007and 2007/2008)

Seasons	2006/2007					2007/2008				
Depth/(cm)	Sand %		Silt	Clay	Texture class	Sand %		Silt	Clay	Texture class
	Course	fine				Course	fine			
0-20	39.69	37.11	21.80	1.40	Sandy loam	15.29	58.43	24.58	1.70	Sandy loam
20-40	50.85	32.70	16.22	0.23	Sandy loam	12.91	58.78	25.36	2.95	Sandy loam

Table 3: Some Chemical properties of soil samples at El –hammam experimental farm

Characters depth cm	pH	EC (ds/m)	Soluble cations (meq100g)				Soluble anions (meq/100g)		
			Ca++	Mg++	Na+	K+	HCO3-	CL-	SO4--
2006/2007 season									
0-20	8.28	0.50	1.80	0.99	1.18	1.03	1.75	2.97	0.28
20-40	8.31	0.49	1.60	1.06	1.30	0.94	1.75	2.96	0.19
2007/2008 season									
0-20	7.90	0.48	1.93	0.50	1.50	0.87	1.75	1.92	1.13
20-40	8.40	3.00	6.50	3.00	1.85	2.00	3.00	2.30	4.00

3. treatments

The experiments included 8 treatments, which were the combination of four irrigation schedule depths, as supplementary irrigation treatments, and two bio-fertilizer levels as follows:

I-Irrigation schedule depth (mm):

1-without supplementary irrigation (rainfall), control.

2-supplementary irrigation by 60 mm/fed ($252m^3$/fed).

3-supplementary irrigation by 90 mm/fed ($378m^3$/fed).

4-supplementary irrigation by 120 mm/fed ($504m^3$/fed).

II-Bio-fertilizer application:

1-without bio-fertilization (control).

2-Microbein as (Psedomonnas sp., Azotobacter sp., Azospirillum sp. and B. megaterium).

The previous mentioned treatments were arranged in split plot design in four replications, the main plots were occupied with supplemental irrigation and the sub plots were occupied with bio-fertilizer application. The area of the experimental units were 45m2 (3m X 15m). Number of rows was 20 per plot, 15cm apart and length of 15m.

Grains of Sakha-93 wheat cultivar was used in both seasons, supplied by the Wheat Research Division, Agriculture Research Center, Ministry of Agriculture.

Grain preparation by soaking in tap water for 24 hours followed by air drying., The grains were divided into two parts, the first one was without bio-fertilizer (control), and the second was coated with (Microbein). For land preparation, the experimential area was prepared by clearing surface soil, plowing and compacting the soil surface

The supplementary irrigation treatments were added by gated pipe distribution system and the irrigation water quantities measured through flow meter.irrigation system every treament of supplemental irrigation was divided to three equal amounts at tillering stage ,botting stage and filling grain period.The soil was fallow in the summer before plnting wheat in both seasons. Wheat grains were sown in 31st December 2006 and 28th November 2007 at rate of 30 kg/fed, in the first and second seasons, while the harvesting dates were 21st

April 2006 and 28th April 2008 In the first and second seasons, respectively. Grains were broadcasted with the certain rate of the cultivated strip and then covered.Sowing date was 31/12/2006 in the first seasons, while sowing date was 28/11/2007in the second seasons.Debending on the first effective rain fall as shown in the table (1)

4. Yield and its component measurements

A quadrate of (2.5mx5m) was harvested from each of the four replicates at harvest (dead yellow stage)and the following measurements were recorded in wheat crop:

Wheat yield and its components:

1-Plant height at harvest (cm),
2-Number of tillesr/plant
3-Number of tillers/m^2
4-Spike length (cm)
5-Number of spikelets/spike
6-Number of spikes/m^2
7-Number of grains/spike
8-1000- grain weight (g)
9-Biological and straw yields (ton/fed)
10-Grain yield(kg/fed)
11-Tillering index= number of spikes/m^2/number tillers/m^2

Water use efficiency=Grrain yield (kg/fed.)/Amount of total water supply (m^3/fed)

5. Statistical analysis

Data obtained were statistically analyzed using the appropriate analysis of variance according to Gomez and Gomez (1984). LSD at 5% level was used to compare between means.

RESULTS AND DISCUSSION

1. Yield and yield components:

1. Effect of supplementary irrigation:

Data in table (4) recorded the effect of supplementary irrigation schedule on wheat yield and its components. the data indicated that oll characters were significantly affected by supplementary irrigation schedule viz, non irrigation (rainfed only) and supplementary irrigation with 60, 90 and 120 mm/fed in both seasons.

The highest values of studied characters i.e. plant height at harvest (cm), number of spikes/m2, number of grains/spike, 1000 grain weight(g), biological, straw yields

(ton/fed) and grain yield(kg/fed), were obtained by adding 120 mm/fed as a supplementary irrigation.

The superiority of supplementary irrigation, at the rate of 120 mm/fed, in the yield and its components in both seasons may be due to the increase in number of spikes and tillers/m2, number of grains and spikelts/spike, spike length, weight of 1000 grains as indicated in Table (4).

Similar results were obtained by Malidarreh (2010). under rain fed condition in Iran, found that applying water supply to wheat in three levels i.e. one irrigation with 50mm at heading stage, two irrigation times with 100mm atheading and anthesis stages, and three times with 150mm at heading anthesis and grain filling stages produced more tiller number/m2, fertile tillers number/m2,. Howeverin the absence of irrigation, 1000-grain weight reduce from 45to40g. Also, this treatment increased wheat grain yield by 21,27,and 29%,resectively, Malaia et al., (1997). Increasing growth characters as a result of applying supplementary irrigation with 120 mm/fed caused superiority in yield and its components. These results may be due to the effect of water on encouraging call division, elongation and turgidity which in turn increase dry matter. Kumar et al., (1994) indicated that irrigated treatments increased significantly grain yield and its attributes (spike length and 1000 grain weight) compared with un irrigated treatment. Similar results were obtained by (Mc-

Master et al., (1994) and Frederick and Camberato,(1995). Under high amount of water application (120mm/fed), the assimilates directed to the vegetative organs more efficiently the yield ones which led to a decrease in water use efficiency comparing to watering supplemental irrigation moderately i.e., using 90 mm/fed., kassab et al.,(2007) found that significantly differences among the tretments of supplemental irrigation in1000-grain weight, harvest index, grain yield, as well as straw and biological yield

2. Effect of bio-fertilization:

Data in table (5) showed that the yield and its components were significantly increased,for all the studied characters with application of bio-fertilizer i.e., plant height at harvest (cm), number of spikes/m2, number of grains/spike, 1000 grain weight (g), biological, straw yields (ton/fed) and grain yield (kg/fed) compored to the control (without bio-fertilizer). There were significant differences in all yield characters and these differences were fairly true under the probability of 5% level of significance. Bio-fertilizers had marked effect on all mentioned characters compared to plants without bio-fertilizer. The increment in yield and its components may be due to the increase in vegetative growth of plants and these results may be due to response of wheat to environmental conditions and effects of fertilization package on enhancing root growth and dry matter accumulation.

Generally, under bio-fertilizer treatment, grain, straw and biological yields, were increased in both seasons as shown in table(5), and the bio-fertilized plants scored the highest values for oll yield and its components in both first and second seasons. These results were in harmony with previous findining of, Sing et al., (2002) who reported that sink capacity of the plant is dependent mainly on vegetative growth of plant. Vigorous vegetative growth may be result of the application of bio-fertilizer and supply of photosynthates for formation of tiller and spikes

of wheat. Also, El-Baba, (2000), Sharma et al., (2000) and Verma et al., (2000) studied the effect of fertilization on yield and yield attributes of wheat,

Table 4: Effect of supplementary irrigation on wheat yield throughout the two growing seasons (2006/2007and2007/2008)

Characters / Bio-fertilizer	Plant height (cm)	Number of tillers/plant	Number of tillers/m²	Number of spikes/m²	Spike length (cm)	Number of spikelets/spike	1000-grain weight	Number of grains/spike	Biological yield (ton/fed)	Grain yield (kg/fed)	Straw yield (ton/fed)	Tillering index%	WUE Kg/ m3
2006/2007													
Rainfed (Control)	31.65	1.41	84.94	81.58	5.66	10.54	35.4	35.74	0.79	251.95	0.54	0.68	0.41
+ 60 mm/fed	45.04	3.25	177.33	165.66	8.08	14.08	35.8	41.24	1.55	440.31	1.11	0.79	0.52
+ 90 mm/fed	48.95	3.96	251.03	239.93	8.60	14.93	36.2	44.84	2.31	657.20	1.65	0.89	0.65
+ 120 mm/fed	61.26	4.35	309.55	295.31	9.79	15.79	36.4	49.29	2.48	718.24	1.76	0.94	0.65
LSD at 5%	2.9485	0.2250	17.2959	14.83	0.48	0.68	0.36	3.9364	0.11	29.68	0.09	0.02	.....
2700/2008													
Rainfed (Control)	47.48	2.12	127.41	122.37	8.49	15.81	35.8	53.61	1.19	377.93	0.81	1.02	0.67
+ 60 mm/fed	67.56	4.88	266.00	248.49	12.12	21.12	36.2	61.86	2.33	660.47	1.67	1.19	0.78
+ 90 mm/fed	73.43	5.94	376.55	359.90	12.90	22.40	36.8	67.26	3.47	985.80	2.48	1.34	0.98
+ 120 mm/fed	91.89	6.53	464.33	442.97	14.69	23.69	37.5	73.94	3.72	1077.36	2.64	1.41	0.97
LSD at 5%	4.42	0.34	25.94	22.25	0.72	1.02	0.45	5.90	0.17	44.52	0.14	.03	....

Table 5: Effect of bio-fertilizer on wheat yield during the two growing seasons (2006/2007and2007/2008)

Characters / Bio-fertilizer	Plant height (cm)	Number of tillers/plant	Number of tillers/m²	Number of spikes/m²	Spike length (cm)	Number of spikelets/spike	1000-grain weight	Number of grains/spike	Biological yield (ton/fed)	Grain yield (kg/fed)	Straw yield (ton/fed)	Tillering index%	WUE Kg/ m3
2006/2007													
Control	42.1	2.67	183.28	177.00	7.44	12.78	34.6	40.08	1.67	490.09	1.18	0.80	0.53
Bio-fertilizer	51.35	3.82	228.14	214.24	8.63	14.89	37.3	45.48	1.89	543.76	1.35	0.85	0.58
LSD at 5%	1.9208	0.1084	6.5108	12.7043	0.2841	0.0381	1.3	1.3058	0.0519	20.90	0.0382	0.0195	.....
2007/2008													
control	63.15	4.01	274.92	265.5	11.16	19.17	35.2	60.12	2.51	735.14	1.77	1.20	0.79
Bio-fertlizer	77.03	5.73	342.21	321.36	12.95	22.34	37.8	68.22	2.84	815.64	2.03	1.28	.0.88
Lsd at 5%	2.88	0.16	9.77	19.06	.43	.06	1.6	1.96	.08	31.35	0.06	0.03	.....

Table 6: effect of the interaction between supplementary irrigation and bio-fertilizer on wheat yield and its component (2006/2007and2007/2008) growing seasons

Characters		Plant height (cm)	Number of tillers/plant	Number of tillers/ m^2	Number of spikes/ m^2	Spike length (cm)	Number of spikelets/ spike	1000-grain weight	Number of grains/spike	Biological yield (ton/fed)	Grain yield (kg/fed)	Straw yield (ton/fed)	Tillering index%	WUE Kg/m3
irrigation	Bio-fertlizer													
2006/2007														
Rainfed	Without	27.15	1.13	70.63	48.68	5.40	9.50	34	35.18	0.691	227.00	0.464	0.64	.037
(control)	With	36.15	1.70	99.25	114.48	5.93	11.58	36.7	36.30	0.891	276.90	0.614	0.74	0.45
+60mm/fed	Without	40.95	2.58	154.93	153.93	7.43	13.08	34.6	38.48	1.419	409.50	1.009	0.77	0.48
	With	49.13	3.93	199.73	177.40	8.73	11.58	37	44.00	1.683	471.13	1.212	0.82	0.55
+90mm/fed	Without	44.58	3.45	231.65	236.45	7.98	14.18	34.8	42.65	2.201	634.93	1.565	0.87	.064
	With	53.33	4.48	270.40	243.40	9.23	15.68	37.5	47.03	2.412	679.48	1.733	0.90	0.66
+120mm/fed	Without	55.73	3.53	275.90	268.95	8.95	14.35	35	44.0	2.359	688.93	1.671	0.93	0.62
	With	66.80	5.18	343.20	321.68	10.63	17.23	37.8	54.58	2.596	747.55	1.848	0.95	0.67
LSD at 5%		n.s	.022	13.03	25.42	n,s	n.s	2.2	2.61	0.18	25.42	0.03	n.s	ns-
2007/2008														
Rainfed	Without	40.73	1.70	105.95	73.02	8.10	14.25	34.3	52.77	1.04	340.50	0.70	0.96	0.56
(control)	With	54.23	2.55	148.88	171.72	8.90	17.37	37.2	54.45	1.34	415.35	0.92	1.11	0.68
+60mm/fed	Without	61.43	3.87	232.40	230.90	11.15	19.62	35.7	57.62	2.13	614.25	1.51	1.16	0.72
	With	73.70	5.90	299.60	266.10	13.10	17.37	37.5	66.00	2.52	706.70	1.82	1.23	0.83
+90mm/fed	Without	66.87	5.18	347.48	354.68	11.97	21.27	35	63.98	3.30	952.40	2.35	1.31	0.96
	With	80.00	6.72	405.60	365.10	13.85	23.52	38	70.55	3.62	1019.22	2.60	1.35	0.99
+120mm/fed	Without	83.60	5.30	413.05	403.43	13.43	21.53	35.8	66.00	3.54	1033.40	2.51	1.40	0.93
	With	100.20	7.77	514.80	482.52	15.95	25.85	38.5	81.87	3.89	1121.33	2.77	1.43	1.01
LSD at 5%		n.s	0.33	19.54	38.13	n.s	n.s	2.35	3.92	0.27	38.13	0.04	n.s	ns-

and recorded increases in grain yield/ha, 1000-grain weight, number of spikes/m2 and plant height. Bassel, et al., (2001) studied the effect of bio-fertilization (inoculation with serealin and un-inoculation). They showed that bio-fertilizer application resulted in significant increases in plant height, number of spikes/m2, number of grains/spike, 1000 grain weight, grain and straw yields/fed. Raj-Sing (2003) investigated the response of wheat to the different nutrients management. He showed that the application of farmyard manure 5 t/ha + 50 kg N + 30 kg P2O5/ha + bio-fertilizer inoculation gave maximum grain yield(3.79 t/ha). Salem et al., (2003) studied the effect of mineral fertilizer (31 kg N + 22.5 kg P2O5 + 24 kg K2O) on Sakha 93 wheat cultivar, They found increases in grain, straw and biological yields/fed, under fertilization treatment compared with un-fertilization Attia et al.,(2005). under rainfed conditions at west matrouh studied the effect of fertilizer package on growth yield and yield componet of wheat. They noticed that number of tillers and spikes length, spikes/m2,1000-grain weight, number of grain /spike, grain, straw, and biological yield were increased by applied fertilization package as compored with without fertilizer.

3. Effect of the interaction between bio fertilizer and supplementary irrigation schedule under rainfed conditions.

Data in table (6) show the effect of the interaction between bio-fertilizer and supplementary irrigation schedule on some yield and its components during the two growing seasons (2006/2007 and 2007/2008) the highest value were recorded for some character i.e.. number of tillers/plant, number of tillers/m2, number of spikes/m2 and number of grains/spike under bio fertilizer application and adding supplemental irrigation up to120mm/fed, in both seasons. The lowest values for the mentioned characters were obtained without bio-fertilizer (control) and without supplementary irrigation (rainfed) in both seasons.it was noticeable that there were insignificant differences for plant height, spike length and number of spikelets/spike .In this respect. Hooda and Agarwal (1997) obtained similar results. Sushila and Giri (2000) reported that number of spike/m2, grain weight/spike and grain yield were favorably affected by increased irrigation and nitrogen levels.

With respect to water use efficiency (WUE)The highest value (0.67and1.01 kg/m3) was obtained by adding bio- fertilizer and supplemental irrigation up to 120mm/fed,in two seasons, respectively.

CONCLUSION

Despite of the enormous attempts have been carried out to increase wheat production and consumption of wheat grains still vast So, increasing wheat production by enhancing the total cultivate area with wheat become an important national goal

The areas of the North Western Coast of Egypt were the main areas for achieving this target. These areas are characterized by low rainfall rate (average of the last 50 years is 133 mm/year), but evapo transpiration is low due to mild temperatures, cloudy skies, formation of dew on the plants during he growing seasons, and soil texture which varies between sandy and sandy loamy that has reasonable water holding capacity, hence the decision makers planed to install some great canals to convey the Nile water to the different parts of Egyptian desert, such as El-Hammam canal, which was designed to support the rainfed agricultural with supplementary irrigation to get improved yields. The most important crops in this areas are wheat (Sawarkar and Gaydani, 1996).

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الملخص العربى

تأثير الرى التكميلى والتسميد الحيوى على انتاجية محصول القمح تحت ظروف الزراعة المطرية

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اقيمت تجربتان حقليتان بمنطقة الحمام بمحافظة مطروح بالساحل الشمالى الغربى لجمهورية مصـر العربيـة خلال موسمين زراعيين ٢٠٠٧/٢٠٠٦ و٢٠٠٨/٢٠٠٧ لدراسة تاثير التسميد الحيوى وكمية ماء الرى كرى تكميلى على محصول القمح صنف سخا٨ ومكوناته واشتملت عوامل الدراسة على:

١-التسميد الحيوى ويشمل:

أ-بدون تسميد

ب-التسميد بالميكروبين

٢-الرى التكميلى ويشمل

أ-بدون رى تكميلى (مطر فقط)

ب-رى تكميلى بمقدار ٦٠مم/فدان

ت-رى تكميلى بمقدار ٩٠مم/فدان

ث-رى تكميلى بمقدار ١٢٠مم/فدان

وقد نفذت التجربة فى نظام القطع المنشقة مرة واحدة حيث وزعت معاملات الرى فى القطع الرئيسية بينما احتلت معاملات التسميد الحيوى فى القطع االشقية فى اربعة مكررات.

تم اخذ القياسات التالية على المحصول ومكوناته عند الحصاد.

١-ارتفاع النبات (سم)

٢-عدد الافرع/نبات

٣-عدد الافرع/م٢

٤-عدد السنابل

٥-طول السنبلة

٦-عدد السنبلات / السنبلة

٧-عدد الحبوب/السنبلة

٨-المحصول البيولوجى والحبوب والقش (طن/فدان)

٩-دليل التفريع%

١٠-كفاءة استخدام مياة الرى كجم/م٣

ويمكن تلخيص اهم النتائج المتحصل عليها كالاتى:

١-ادى اضافة ١٢٠مم/فدان كرى تكميلى الى اعلى زيادة معنوية لصفات عدد السنابل والاشطاء /م٢ وعدد الحبوب والسنيبلات/سنبلة وطول السنبلة ووزن الالف حبة والمحصول البيولوجى والحبوب والقش ودليل التفريع وتلاها اضافة ٩٠ و٦٠مم/فدان كرى تكميلى على التوالى لنفس الصفات السابقة فى كلا الموسمين مقارنة بالرى بماء المطر فقط.

٢-كما ادي التسميد الحيوى الى زيادة كلا من صفات المحصول (عدد السنابل والاشطاء/م٢ وعدد الحبوب والسنيبلات/سنبلة ووزن الالف حبة والمحصول البيولوجى والحبوب والقش ودليل التفريع فى كلا الموسمين مقارنة بعدم التسمي.

٣-اعطى التفاعل بين التسميد الحيوى والرى التكميلى بمقدار ١٢٠مم/فدان اعلى زيادة معنوية لصفات عدد السنابل والاشطاء/م٢ وعدد الافرع/نبات فى حين لم تتاثر باقى صفات المحصول.