ISSN 1110-0419

Annals Of Agric. Sc., Moshtohor,
Vol. 46(3): Ag. 185-196, (2008).

EFFECT OF IRRIGATION, NITROGEN FERTILIZER AND ASCORBIC ACID ON WHEAT PRODUCTIVITY IN SANDY SOIL. I-YIELD AND YIELD COMPONENTS

BY

Sary, G.A.*; Salwaa M.I.*; Thabet, E.M.A.* and EL- Sherbeny, T.M.S.**

* Agron. Department, Fac. of Agric. Moshtohor, Benha Univ.
** Plant Res. Section, Nuclear Research Center, Atomic Energy Authority, Egypt.

ABSTRACT

Two field experiments were carried at the experimental farm, Nuclear Research Center, Atomic Energy Authority, Inshas, during of 2004/2005 and 2005/2006 growing seasons to study the effect of three irrigation treatments 40,60 and 80% available soil moisture depletion(ASMD), three concentration of ascorbic acid (0, 500 and 1000 mg/L) and three nitrogen rates (60, 80 and 100 kg N/fed.) on grain yield and yield components of wheat as well as water and nitrogen use efficiency under improved sandy soil by using plant residues. The results could be summarized as follows:

1- Irrigation at 40% available soil moisture depletion, gave the highest values of number of spikes/ m^2, spike characters, 1000-grain weight and grain yield/feddan. While, irrigation at 60 % ASMD gave the maximum rate of nitrogen and water use efficiency. On the contrary, irrigation at 80 % ASMD significantly decreased all the studied characters.
2- The highest values of numbers of spikes/m^2, spike length(cm), number and weight grains, 1000- grain weight(g), grain yield /fed. and water and nitrogen use efficiency were obtained by spraying ascorbic acid compared with unsprayed treatment and there is not a significant effect between the two concentrations i.e. 500 and 1000 mg/L in both seasons.
3- The results indicated that grain yield and its components and water use efficiency were significantly increased by increasing N-rate up to 100 Kg N /feddan, while addition of 80 Kg N/feddan gave the highest nitrogen use efficiency.
4- The interaction between the three factors significantly, affected on 1000- grain weight, grain yield and N-use efficiency in both seasons while spike length in the second season.

INTRODUCTION

Increasing cultivated of wheat production of unit land area are the most important national objectives in Egypt for minimizing the gape between the production and population consumption. That could be achieved by improving agricultural practices especially in desert area such as irrigation and fertilizers.

Wheat (*Triticum aestivium* L.) is considered the main cereal grain crop in the world as well as in Egypt. Therefore, increasing grains production is considered one of the most important national aims to face the great demand of the highly increasing human population.

Irrigation is used to maintain the soil moisture profile in the root zone to field capacity and satisfied evapotranspiration requirement of each crop on any area. Mousa and Abdel-Maksoud (2004), Hussein (2005), El-Afandy (2006) and Fang *et al.*, (2006) found that subjecting wheat plants to drought –stress resulted in a significant reduction in grain yield and its components of wheat.

Spray of vitamin C increased grain yield of wheat by influencing many physiological processes such as stimulates respiration activates, cell division and many enzymes activities as reported by Oertil (1987), Abd El-Hamed *et al.*, (2004), Irfan *et al.* (2006) and Zewail (2007).

Also, El-Sherbeny (2003), Salem (2005), Soliman (2006) and Zewail (2007) revealed that yield and its components of wheat were significantly increased by increasing rate of nitrogen fertilizer up to 120 Kg N /feddan.

MATERIALS AND METHODES

Two field experiments were performed in 2004/2005 and 2005/2006 growing seasons at the experimental farm at Inshas, Nuclear Research Center, Atomic Energy Authority to study the effect of irrigation, N-rate and ascorbic acid on yield and its components of wheat (*Triticum aestivium*, L.) under improved sandy soil using plant residues as recommended by El-Sherbeny (2003).

The soil type was sandy and the physical and chemical properties of the Experimental farm at Inshas are shown in Table (1).

Table (1): Some mechanical and chemical analysis as well as physical properties of upper 30 depth of Inshas sandy soil of the experimental in two seasons.

Characters		Mechanical analysis	
		1st season	2nd season
Clay	(%)	2.40	3.64
Silt	(%)	5.21	6.18
Fine sand	(%)	63.14	61.40
Coarse sand	(%)	24.75	23.58
Texture class		Sandy soil	Sandy soil
		physical properties	
Water holding capacity	(%)	7.74	7.93
Wilting point	(%)	1.96	2.09
Bulk density	(g/cm^3)	1.72	1.73
		Chemical analysis	
pH		7.8	7.9
Organic matter	(%)	0.60	0.70
$CaCo_3$	(%)	3.9	4.5
Aval. N	(mg/ kg)	33.1	30.0
Aval. P	(mg/ kg)	8.7	9.8
Aval. K	(mg/ kg)	135	139
E.C.	(d/s)	0.8	0.9

Each experiment included 27 treatments which were the combination of three irrigation treatments (Irrigation at 40, 60 and 80 % of the available soil moisture depletion (ASMD), three concentration of ascorbic acid (zero, 500 and 1000 mg/L as foliar spray and three rate of nitrogen fertilizer (60, 80 and 100 kg N/feddan). The design of the experiment was a split-split plot with three replications. Irrigation treatments were arranged in the main plot, while ascorbic concentrations were randomly distributed in the sub plots and nitrogen fertilizer rate were randomly allocated in the sub-sub plots. Each sub-sub plot area was $10.5m^2$ (3.5m long and 3 m wide).Wheat grain cv. Sakha 93 were drilled in rows, 15 cm apart on November 24th in both seasons.

At harvest number of spikes/m^2, spike length (cm), number of grain/spike, weight of grains/ spike (g) which were estimated as an average of 10 spikes were taken at random from each sub-sub plot, 1000-grain weight (g) and grain yield (kg/feddan) after threshing the harvest area from the whole sub-sub plot.

Also, nitrogen utilization was determined according (I.A.E.A, 1990) using the following nitrogen derived from fertilizer (Ndff).

$$Ndff \frac{\%N\text{-}15 \text{ a.e(atomexcess)in plantsample}}{\%N\text{-}15 \text{ a.e(atomexcess)in fertilizer}} x100$$

$$\text{Fertilizer N - yield} = \frac{Ndff}{100} x \text{ N - yield}$$

$$\%\text{ N - Utilized} = \frac{\text{Fertilizer N yield}}{\text{Fertilizer N applied}} x100$$

And water use efficiency (W.U.E.) was calculated by using the following formula according to Vites (1965).

$$W.U.E. \frac{\text{Grain yield Kg/fed}}{\text{Evapotranspiration (m3 /fed).}}$$

Data in each season were statistically analyzed according to the procedures outlined by Snedecor and Cochran (1980). The MSTATE program (1989) was used in this connection.

RESULTS AND DISCUSSION

A-Effect of main factors:-

1- Yield components of wheat grains:

Results in Table (2) reveal that number of spikes/ m^2, spike length, number of grains/ spike, weight of grains/ spike and 1000 – grain weight were significantly affected by irrigation treatments, concentrations of ascorbic acid and N-rate in the two growing seasons.

Irrigation at different losses in available water soil i.e. 60 and 80 % caused a significant decrement in the above mentioned characters in both seasons when compared with irrigation at 40 % ASMD. Irrigation at 40 % of the available soil moisture depletion gave the highest values of number of spikes/ m^2, spike characters and 1000- grain weight in 2004/2005 and 2005/2006 growing seasons.

These results are due to water stress which decreasing the activity of merstimatic tissues responsible for increasing the tillers number. Also, the reduction in number of grains/spike by increasing water stress probably resulted from the complete development of some grains of the spike this reduction was affected greatly on the amount of photosynthesis in grains because of lake of water. These results are in harmony with those obtained by Mousa and Abdel-Maksoud (2004) Hussein (2005) and Fang *et al.* (2006).

Concerning to ascorbic acid, the mean values of spikes/m^2, spike length, grains number/spike, grains weight/spike and 1000-grain weight were significantly increased by sprayed the ascorbic acid on wheat plants at 1000 and 500 mg/L as when compared with unsprayed wheat in the two growing seasons. These results may be due to spray vitamin C influencing many physiological process such as stimulates respiration activities cell division and many enzymes activities as reported by Oertil (1987), Abd-El-Hamed *et al.* (2004), Irfan *et al.* (2006) and Zewail (2007).

It was clear in Table (2) that fertilization of wheat with 60, 80 and 100 Kg N/feddan gave a significant increment at the second and third rate when compared with the first rate (60 Kg N/feddan) in number of spikes/ m^2, spike characters under study and 1000- grain weight in both seasons.

The increment due to fertilization with 100 Kg N/feddan reached 12.29 and 14.28 % in number of spikes/ m^2, 20.19 and 16.39 % in spike length, 13.44 and 15.05 % in number of grains/ spike, 28.15 and 26.84 % in grain weight/ spike, 9.75 and 9.41 % in 1000-grain weight in the first and second seasons, respectively as compared to fertilization with 60 Kg N/feddan. The increase in yield components of wheat due to N- application is an indication for the role of N in plant growth development and production. These results are in harmony with those obtained by El-Sherbeny (2003), Salem (2005), Soliman (2006) and Zewail (2007).

2- Grain yield/feddan:

The effect of irrigation, ascorbic acid and nitrogen fertilizer on grain yield of wheat is presented in Table (2).

Table (2): Effect of irrigation treatments, ascorbic acid and nitrogen rates on yield and yield components of wheat as well as nitrogen and water use efficiency in both seasons.

Characters		No.of spikes /m²		Spike length (cm)		No. of grains/ spike		Weight of grains/ spike (g)		1000-grain weight (g)		Grain yield (kg/Fed.)		Nitrogen utilized (%)		Water use efficiency (kg/m³)	
Treatments		Seasons															
		1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Irrigation	I_1	351a	362a	12.08a	12.99a	37.3a	39.6 a	1.91a	2.05a	45.29a	43.72a	2487a	2587a	31.99 b	35.50 b	1.348 b	1.396 a
	I_2	337b	354a	11.25b	11.92b	34.8b	37.3 b	1.69b	1.90b	41.01b	39.90b	2250b	2332b	34.46 a	36.95 a	1.407 a	1.448 a
	I_3	253c	259b	8.45 c	8.69 c	27.1c	26.5 c	1.13c	1.24c	35.67c	35.00c	1688c	1692c	21.91 c	23.92 c	1.051 c	1.223 b
F-test		**	*	**	**	**	**	**	*	**	**	**	**	**	**	**	**
Ascorbic acid	S_1	289c	309b	9.86b	10.28c	31.7b	32.7 c	1.49b	1.57c	37.44b	36.38c	1948b	2013c	25.62 c	27.94 c	1.154 b	1.241 c
	S_2	321b	341a	10.89a	11.50b	33.6a	34.8 b	1.61a	1.74b	42.17a	40.57b	2231a	2269b	31.06 b	33.83 b	1.321 a	1.392 b
	S_3	331a	346a	11.03a	11.82a	33.9a	36.8 a	1.64a	1.87a	42.34a	41.67a	2247a	2328a	31.65 a	34.22 a	1.330 a	1.434 a
F-test		**	**	**	**	*	**	**	**	**	**	**	**	**	**	**	**
Nitrogen	N_1	293c	301c	9.46 c	10.25c	30.5c	31.9 c	1.35c	1.49c	38.46c	37.53c	1903c	2001c	29.72 b	32.75 a	1.127 c	1.234 c
	N_2	318b	330b	10.94b	11.43b	33.9b	35.2 b	1.66b	1.81b	41.30b	40.03b	2227b	2273b	31.34 a	33.50 a	1.317 b	1.393 b
	N_3	329a	343a	11.37a	11.93a	34.6a	36.7 a	1.73a	1.89a	42.21a	41.06a	2295a	2337a	27.32 c	30.01 b	1.361 a	1.440 a
F-test		**	*	**	**	*	**	**	**	**	**	**	**	**	**	**	**

I_1 = Irrigation at lose 40% A.S.M.D
I_2 = Irrigation at lose 60% A.S.M.D
I_3 = Irrigation at lose 80% A.S.M.D

S_1 = Zero ascorbic acid
S_2 =500 mg/L ascorbic acid
S_3 = 1000 mg/L ascorbic acid

N_1 = 60 kg N/feddan
N_2 = 80 kg N/feddan
N_3 = 100 kg /N/feddan.

The results show that the grain yield of wheat Kg/fed. was significantly affected by irrigation treatments in both seasons. It was observed that irrigation at 40 % of the available soil moisture depletion significantly surpassed the irrigation at 60 and 80 % of the available soil moisture depletion by 10.53 and 47.33 %, respectively in the first season as well as by 10.93 and 52.90 %, respectively in the second season. This is to be expected since the mean values of spikes number/m^2, grains number/ spike, weight of grains/ spike and 1000 – grain weight increased by decreasing soil moisture depletion. Moreover drought stress might reduce translocation of assimilates from leaves and as drought hasten maturation, this response in addition to reduced photosynthesis in the grains itself contribute to lower grain yield. Similar results were indicated by Hussein (2005), El-Afandy (2006) and Fang *et al.* (2006).

With regard to ascorbic acid, a significant result has been observed as a results of spraying ascorbic acid on wheat plants expressed as grain yield Kg/feddan. The application of ascorbic acid at 1000- mg/L. increased grain yield by 15.35 and 15.64 % in the first and second seasons, respectively, when compared to unsprayed of ascorbic acid, There is not a significant effect between 500 and 1000 mg/L. on grain yield in both seasons. This might be attributed to that the soil of this area contained considerable amount of both macro and micronutrients. Also, the positive response of wheat plants may be due to that ascorbic acid activity some enzymes which are important in regulation of photosynthetic carbon reduction (Helsper *et al.*, 1982).

Also, it could be noticed that rate of nitrogen (100 Kg N /fed.)gave a highly significant increasing grain yield Kg/feddan than 60 and 80 Kg N/feddan in the two growing seasons. The application of 80 and 100 Kg N/feddan resulted in significant increase in grain yield Kg /feddan over application of 60 Kg N/feddan by 17.03 and 20.60 %, respectively in the first season. The corresponding significant increases in grain yield were 13.59 and 16.79 %, respectively in the second season. The increase in grain yield/fed. due to the increase in N- rate is a result of the effect of N which increasing number of spikes/ m^2, number of grains/ spike, weight of grains/ spike and 1000-grain weight. This is clear illustration for the prominent role of N in increasing grain yield under the sandy soil conditions. These results reported by Salem (2005), Soliman (2006) and Zewail (2007).

3- Efficiency of nitrogen and water:

Nitrogen and water use efficiency in wheat plant as affected by irrigation treatments, ascorbic acid and N- level in 2004/ 2005 and 2005/2006 growing seasons as shown in Table (2).

Irrigation at 60 % of the available soil moisture depletion enhanced significantly nitrogen and water use efficiency in the two growing seasons, whears irrigation at 80 % of the available soil moisture depletion gave the lowest efficiency of nitrogen and water. Nitrogen losses under prolonged intervals of irrigation due to nitrogen transformation may be the reason behind the utilization efficiency reduction. These results could be attributed to the highly significant differences between the wheat grain yield values as well as differences among consumptive use. In this connection, Sadek and Mitkees (1997) and El-Sherbeny (2003) found that nitrogen and water use efficiency gave the best results when irrigated 50 and 70 % available soil moisture depletion.

On the other side, nitrogen and water use efficiency were significantly resulted in increasing over the control (zero ascorbic acid) by foliar application of ascorbic acid in the two seasons. Foliar application of ascorbic acid at 1000 – mg/L. gave the maximum value of nitrogen and water use efficiency. Grun *et al.* (1982) reported that ascorbic acid is a product of D-glucose metabolism which effects nutritional cycles activity in higher plants, Ascorbic acid plays an important role in the electron transport system.

It was clear that from Table (2) the application of nitrogen fertilizer at 80 Kg N/

feddan to wheat resulted in increasing significantly. The N-utilized when compared with application of nitrogen at 100 Kg N/ feddan in the growing seasons, while water use efficiency was significantly increased by increasing N-rate up to 100 Kg N/feddan. The previous results are in accordance with those reported by Sowers *et al.* (1994) in N-use efficiency and El-Sherbeny (2003) in water use efficiency.

B- Interaction.

The interaction between irrigation and ascorbic acid was significant on number of spike/m^2, weight of grains/ spike, 1000-grain weight, grain yield Kg/feddan, N-utilized and water use efficiency in both seasons while spike length and number of grains/ spike in the first season only (Table 3). The results showed that ascorbic acid when sprayed on wheat plants which were irrigated early (at 40 % available soil moisture depletion) gave the greatest mean values of number of spikes/ m^2, spike characters, 1000- grain weight and grain yield/feddan. Whereas the maximum mean values of nitrogen and water use efficiency were produced when irrigated wheat plants at 60 % available soil moisture depletion and sprayed with 500 or 1000 mg/L. ascorbic acid. It could be noticed that the increase in concentration of ascorbic acid did not affect these traits except 1000-grain weight and grain yield/feddan with the same irrigation, that is to say that 500 mg/ L. is enough to improve yield and yield components of wheat.

There were significant differences in number of spikes/m^2 spike length, grain weight/spike, grain yield/feddan and N- utilized in the two seasons due to the interaction between irrigation treatments and N- levels (Table 4). It could be noticed that early irrigation at 40 % available soil moisture depletion with fertilization at 100 Kg N/ feddan gave the highest values of grain yield and yield components of wheat. On the contrary, the highest nitrogen use efficiency was obtained from irrigation at 60 % available soil moisture with adding 80 Kg N/ feddan in the two growing seasons.

The mean values of number of spikes/m^2, spike length, grain weight/ spike, grain yield/feddan, nitrogen and water use efficiency in both season as will as number of grains/ spike in second season out of two were significantly affected by the interaction between ascorbic concentration and N- rate (Table 5). The maximum mean values of the above character of yield and yield components and water use efficiency were obtained from adding 1000 mg/ L. ascorbic acid + 100 Kg N/feddan. While, the highest N-use efficiency was produced from adding 1000-mg/L. ascorbic acid + 80 Kg N/ feddan in both seasons.

The interaction between the three factors under study significantly affected the 1000- grain weight, grain yield/ feddan and nitrogen use efficiency in the two growing seasons and spike length in the second season (Table 6). Sprayed with 500 or 1000 mg/L. ascorbic acid with 100 Kg N/ feddan and irrigated after 40 % available soil moisture depletion was the best interaction treatment in 1000-grain weight and grain yield per feddan. On the other hand, irrigated at 60 % available soil moisture depletion with sprayed ascorbic at 1000 mg/L. and 80Kg N/feddan increased significantly absorbed nitrogen by wheat plant and then increased nitrogen use efficiency in the two growing seasons.

Table (3): The interaction significantly effects of irrigation treatments with ascorbic acid on yield and yield components as well as nitrogen and water use efficiency.

Characters		No. of spikes /m^2		Spike length (cm) .	No. of grains/ spike	Weight of grains/ spike (g)		1000-grain weight (g)		Grain yield (kg/Fed.)		Nitrogen utilized (%)		Water use efficiency (kg/m^3)	
Treatments		Seasons													
		1st	2nd	1st	1st	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
I_1	S_1	322	355	11.41	35.4	1.78	1.84	41.81	40.78	2249	2318	27.99	30.82	1.220	1.243
	S_2	358	368	12.34	38.1	1.94	2.07	47.02	44.80	2604	2687	33.69	37.52	1.411	1.456
	S_3	373	385	12.48	38.4	2.01	2.23	47.02	45.59	2609	2755	34.29	38.15	1.413	1.489
I_2	S_1	310	317	10.79	34.0	1.63	1.80	37.32	36.36	2013	2124	29.10	31.22	1.256	1.325
	S_2	346	364	11.41	35.1	1.73	1.93	42.78	41.20	2350	2396	36.78	39.18	1.469	1.473
	S_3	353	381	11.56	35.4	1.74	1.97	42.93	42.13	2511	2477	37.39	39.35	1.494	1.545
I_3	S_1	234	252	7.38	25.8	1.05	1.09	33.18	32.00	1580	1598	19.76	21.77	0.986	1.155
	S_2	260	260	8.92	27.6	1.15	1.22	36.71	35.71	1738	1724	22.69	24.79	1.084	1.246
	S_3	273	266	9.04	28.0	1.23	1.42	37.09	37.29	1847	1753	23.27	25.18	1.083	1.267
L.S.D. at 0.05		11.18	29.99	0.290	0.56	0.059	0.169	0.181	0.266	57.42	62.84	0.211	1.204	0.045	0.056

I_1 = Irrigation at lose 40% A.S.M.D
I_2 = Irrigation at lose 60% A.S.M.D
I_3 = Irrigation at lose 80% A.S.M.D

S_1 = Zero ascorbic acid
S_2 =500 mg/L ascorbic acid
S_3 = 1000 mg/L ascorbic acid

N_1 = 60 kg N/feddan
N_2 = 80 kg /N/feddan
N_3 =100 kg N/feddan

Table (4): The interaction significantly effects of irrigation treatments with nitrogen rates on yield and yield components as well as nitrogen and water use efficiency.

Characters		No. of spikes /m²		Spike length (cm).		No. of grains/ spike	Weight of grains/ spike (g)		1000-grain weight (g)		Grain yield (kg/Fed.)		Nitrogen utilized (%)	
Treatments		Seasons												
		1st	2nd	1st	2nd	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
I_1	N_1	327	330	10.75	12.03	37.8	1.68	1.75	42.74	41.76	2190	2307	32.44	36.46
	N_2	355	370	12.53	13.35	39.4	1.99	2.15	46.12	44.16	2610	2694	33.71	36.82
	N_3	371	387	12.95	13.60	41.5	2.07	2.25	47.02	45.25	2662	2759	29.83	33.22
I_2	N_1	311	322	10.02	10.89	35.6	1.34	1.73	38.59	37.55	2015	2126	34.37	37.37
	N_2	344	361	11.67	12.11	38.0	1.85	1.93	41.69	40.50	2324	2390	36.77	38.37
	N_3	355	378	12.07	12.78	39.3	1.90	2.03	42.74	41.64	2410	2481	32.31	35.13
I_3	N_1	242	253	7.61	7.83	22.3	1.03	0.98	34.07	33.27	1506	1571	22.33	24.42
	N_2	256	259	8.63	8.84	28.1	1.15	1.35	36.09	35.44	1747	1734	23.55	25.31
	N_3	262	266	9.10	9.41	29.2	1.21	1.39	36.86	36.29	1812	1770	19.84	22.02
L.S.D. at 0.05		10.53	22.50	0.329	0.203	1.63	0.103	0.145	0.279	0.181	49.01	55.87	0145	1.089

I_1 = Irrigation at lose 40% A.S.M.D
I_2 = Irrigation at lose 60% A.S.M.D
I_3 = Irrigation at lose 80% A.S.M.D

S_1 = Zero ascorbic acid
S_2 =500 mg/L ascorbic acid
S_3 = 1000 mg/L ascorbic acid

N_1 = 60 kg N/feddan
N_2 = 80 kg /N/feddan
N_3 =100 kg N/feddan

Table (5): The interaction significantly effects of ascorbic acid with nitrogen rates on yield and yield components as well as nitrogen and water use efficiency .

Characters		No. of spikes /m^2		Spike length (cm).		No. of grains/ spike	Weight of grains/ spike (g)		1000-grain weight (g)		Grain yield (kg/Fed.)		Nitrogen utilized (%)		Water use efficiency (kg/m^3)	
Treatments		Seasons														
		1st	2nd	1st	2nd	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
S_1	N_1	272	290	8.63	9.03	29.8	1.25	1.33	34.94	33.99	1765	1824	19.97	28.74	1.045	1.140
	N_2	288	300	9.89	10.40	33.1	1.54	1.61	37.54	36.29	1949	2026	26.81	28.74	1.154	1.229
	N_3	306	314	11.06	11.41	35.3	1.68	1.78	39.85	38.87	2128	2190	24.07	26.33	1.262	1.354
S_2	N_1	299	302	9.68	10.62	32.1	1.38	1.49	40.25	38.95	1958	2066	31.20	34.50	1.160	1.255
	N_2	329	341	11.45	11.87	35.2	1.71	1.83	43.05	41.19	2361	2361	33.16	35.70	1.397	1.454
	N_3	336	348	11.52	12.02	37.0	1.73	1.89	43.22	41.58	2373	2380	28.81	31.30	1.407	1.466
S_3	N_1	308	312	10.07	11.10	33.7	1.42	1.64	40.18	39.64	1987	2114	31.96	35.00	1.177	1.366
	N_2	337	350	11.48	12.02	37.2	1.73	1.98	43.31	42.63	2370	2432	34.06	36.02	1.400	1.495
	N_3	347	370	11.52	12.35	37.8	1.76	2.00	43.55	42.73	2383	2440	28.91	31.62	1.414	1.500
L.S.D. at 0.05		10.53	22.50	0.329	0.203	1.63	0.103	0.145	0.279	0.181	49.01	55.87	0.145	1.089	0.030	0.052

I_1 = Irrigation at lose 40% A.S.M.D
I_2 = Irrigation at lose 60% A.S.M.D
I_3 = Irrigation at lose 80% A.S.M.D

S_1 = Zero ascorbic acid
S_2 =500 mg/L ascorbic acid
S_3 = 1000 mg/L ascorbic acid

N_1 = 60 kg N/feddan
N_2 = 80 kg /N/feddan
N_3 =100 kg N/feddan

Table (6): The interaction significantly effects of irrigation treatments, ascorbic acid with nitrogen rates on Spike length, 1000-grain weight, grain yield/feddan and Nitrogen utilized (%).

Characters			Spike length (cm)	1000-grain weight (g)		Grain yield (kg/Fed.)		Nitrogen utilized (%)	
			Seasons						
Treatments			2nd	1st	2nd	1st	2nd	1st	2nd
I_1	S_1	N_1	11.10	39.25	38.48	2062	2112	28.57	31.88
		N_2	12.33	42.02	40.73	2280	2336	29.10	31.16
		N_3	12.90	44.23	43.13	2406	2505	26.31	29.43
	S_2	N_1	12.16	44.71	43.14	2253	2384	34.07	38.39
		N_2	13.73	48.05	45.22	2770	2830	35.43	39.37
		N_3	13.76	48.31	46.04	2789	2849	31.58	34.81
	S_3	N_1	12.83	44.26	43.66	2256	2426	34.67	39.11
		N_2	14.00	48.28	46.53	2780	2916	36.60	39.91
		N_3	14.13	48.50	46.58	2791	2924	31.59	35.43
I_2	S_1	N_1	9.67	35.03	34.00	1830	1890	29.74	32.14
		N_2	11.23	37.09	36.09	1979	2123	30.07	31.68
		N_3	12.30	39.83	39.01	2231	2360	27.49	29.85
	S_2	N_1	11.30	40.29	38.85	2072	2200	36.24	39.90
		N_2	12.57	43.90	42.23	2489	2483	39.68	41.69
		N_3	12.83	44.15	42.53	2489	2505	34.43	35.95
	S_3	N_1	11.60	40.46	39.80	2143	2290	37.13	40.07
		N_2	12.53	44.09	43.18	2503	2564	40.55	41.76
		N_3	13.20	44.25	43.40	2511	2578	34.48	36.24
I_3	S_1	N_1	6.23	30.52	29.48	1405	1470	19.61	22.20
		N_2	7.63	33.52	32.04	1589	1618	21.26	23.39
		N_3	9.03	35.47	34.49	1747	1705	18.41	19.73
	S_2	N_1	8.40	35.74	34.87	1550	1615	23.29	25.21
		N_2	9.33	37.18	36.11	1824	1770	24.35	26.04
		N_3	9.47	37.20	36.17	1841	1787	20.43	23.12
	S_3	N_1	8.86	35.81	35.46	1563	1626	24.09	25.85
		N_2	9.53	37.56	38.19	1828	1816	25.03	26.49
		N_3	9.73	37.91	38.22	1847	1818	20.67	23.20
L.S.D. at 0.05			0.351	0.502	0.314	84.89	96.77	0.251	1.887

REFERENCES

Abd El-Hamed, A.M.; Sarhan, S.H. and Abd El-Salam, H.Z. (2004): Evaluation of some organic acids as foliar application on growth, yield and some nutrient contents of wheat. J. Agric. Sci. Mansoura Univ., 29 (5): 2475-2481.

El-Afandy, K.H.T. (2006): Effect of sowing Methods and irrigation intervals on some wheat varieties grown under saline conditions at South Sinai. J. Agric. Sci. Mansoura Univ., 31(2): 573-58

El-Sherbeny, T.M.S. (2003): Effect of some treated plant residues applied to new reclaimed sandy soil on productivity of some crops using nucler techniques. M. Sc. Thesis, Fac. Agric. Moshtohor, Zagazig Univ., Egypt.

Fang, Baoting; Guo, Tinacai; Wang, Chenyang; He-Shenglien; Wang, Shuli and Wanf, Zhimin (2006): Effects of irrigation on grain quality traits and yield of Yuma 50 at two seasons with different soil water storage. J. of Triticeae crops. 26(3): 111-116.

Grun, M.; Renstorm, B. and Loewus, F.A. (1982): Loss of hydrogen from carbon of D-glucose during conversion of D- (5-H^3-b-C^{14}) glucose to L. Ascorbic acid in *Pelargonium cripum* L . Prodc of Soil Fertility and Foliar fertilization Conf. Giza. Egypt, 14-15 Jan, 1995 No 3, pp 25-34.

Helsper, J.P.; Kagan, L.; Maynard, J.M. and Loewus, F.A. (1982): Ascorbic acid biosynthesis in Ochromonas danica. Plant Physiol. 69:485-468.

Hussein, Samira, M.A. (2005): Effect of supplemental irrigations, seeding rates and foliar application of potassium and macro-Micro elements on wheat productivity under rainfed conditions. Bull. Fac. Agric., Cairo Univ., 56:431-454.

I.A.E.A. (1990): International Atomic Energy Agency. Use of nuclear techniques in studies of soil- plant relation ships. Vinna., 2, 73-77.

Irfan, A.; Basra, S.M.A.; Mahammed, F.and Nawaz, A. (2006): Alleviation of salinity stress in spring wheat by hormonal priming with ABA, Salisalic acid and ascorbic acid. International J. Agric. Biology, 8(1)23-28.

Moussa, A.M. and Abdel-Maksoud, H.H. (2004): Effect of soil moisture regime on yield and its components and water use efficiency for some wheat cultivars. Annals Agric. Sci., Ain Shams Univ., Cairo, 49 (2): 515-530.

MSTAT (1989): A microcomputer program for the design, management and analysis of agronomic research experiments. Michigan State University.

Oertil, J. J. (1987): Exoenous application of vitamins as regulators for growth and development of plant ..Z.Pflanernahr. Bodenr. 150(6):375-391.

Sadek, Eman, M. and Mikees, R.A. (1997): Response of two wheat cultivars to different of nitrogen application at different irrigation intervals. Annual coordination meeting Agric. Res. Cent. Giza, Egypt, 132-138.

Salem, M.A. (2005): Effect of nitrogen rates and irrigation regimes on yield and components of bread wheat (*Triticum aestivum L.*) genotypes under newly reclaimed land conditions. J. Agric. Sci. Mansoura Univ., 30 (17): 6481-6490.

Snedecor, G.W. and Cochran, W.D. (1980): Statistical Methods 7th Edition. Iowa State Univ., Press. Ames. Iowa, U. S. A.

Soliman, Salwa E. (2006): Productivity of some Gemmeiza wheat cultivars under different sowing and N fertilization levels. J. Agric. Sci. Mansoura Univ., 31(11): 6873-6885.

Sowers, Karen, E.; Pan, W.L.; Miller, B.C. and Smith, J.L. (1994): Nitrogen use efficiency of split nitrogen applications in soft winter wheat. Agron. J. 86: 942-948

Vites, F.G. (1965): Increasing water use efficiency by soil management plant environment and efficient water use efficiency. American Society of Agron.

Zewail, Y.M.R. (2007): Improvement of wheat productivity by using some biofertilizers and antioxdants . M.Sc. Thesis, Fac. Agric. Moshtohor, Banha Univ.

تأثير الرى والسماد النيتروجينى وحامض الاسكوربيك على إنتاجية القمح فى الأرض الرملية .
١- المحصول ومكوناته

جابر عبد اللطيف سارى *، محمد اسماعيل محمد سلوع *، السيد محمد عبد الحميد ثابت **، طارق محمد سليمان الشربينى **

* قسم المحاصيل – كلية الزراعة بمشتهر – جامعة بنها.
** قسم البحوث النباتية- مركز البحوث النووية – هيئة الطاقة الذرية المصرية.

أقيمت تجربتان حقليتان فى ارض المزارع التجريبية بمركز البحوث النووية فى إنشاص خلال موسمى ٢٠٠٤/٢٠٠٥ و ٢٠٠٥ /٢٠٠٦ لدراسة تأثير الرى عند استنفاذ ٤٠، ٦٠، ٨٠ % من الماء الميسر مع استخدام ثلاثة تركيزات من حامض الإسكوربيك صفر(كنترول)،٥٠٠، ١٠٠٠ مليجرام/لتر بالإضافة الى ثلاثة تركيزات من السماد النيتروجينى ٨٠،٦٠، ١٠٠كجم ن/ ف على محصول القمح ومكوناته وكفاءة استخدام السماد النيتروجينى والماء فى الأرض الرملية المحسنة بإضافة المخلفات النباتية. وتتلخص اهم النتائج فيما يلى:-

١- أدت المعاملة بالرى عند استنفاذ ٤٠ % من الماء الميسر إلى الحصول على أعلى عدد من السنابل/م٢، صفات السنبلة، وزن الألف حبة وناتج الحبوب للفدان. بينما أعطت المعاملة بالرى عند استنفاذ ٦٠ % من الماء الميسر أعلى معدل لكفاءة استخدام السماد النيتروجينى والماء فى كلا الموسمين وانخفضت معنويا كل الصفات المدروسة بالرى عند استنفاذ ٨٠ % من الماء الميسر.

٢- زاد معنويا كل من عدد السنابل/م٢، طول السنبلة، وزن حبوب السنبلة، عدد الحبوب فى السنبلة، ووزن الألف حبة وناتج الحبوب للفدان وكذلك أفضل معدل لكفاءة استخدام السماد والماء فى كلا الموسمين بالرش بحامض الإسكوربيك مقارنة بالكنترول ولم يكن هناك فرق معنوى بين كلا التركيزين ٥٠٠، ١٠٠٠ مليجرام/لتر .

٣ - زاد عدد السنابل/م٢، طول السنبلة، وزن حبوب السنبلة، عدد الحبوب فى السنبلة، ووزن الألف حبة وناتج الحبوب للفدان بزيادة معدل السماد النيتروجينى حتى ١٠٠كجم ن/ف وكان أفضل معدل لكفاءة استخدام السماد النيتروجينى عند إضافة ٨٠ كجم ن/ ف بينما أعطى المعدل ١٠٠ كجم ن/ ف أعلى كفاءة لاستخدام الماء فى كلا الموسمين.

٤- أظهر التفاعل الثلاثى بين كلا من الرى وحامض الإسكوربيك والسماد النيتروجينى تأثيرا معنويا على كلا من وزن الألف حبة، ناتج الحبوب/ف وكفاءة استخدام السماد النيتروجينى فى كلا الموسمين وعلى طول السنبلة فى الموسم الثانى فقط.