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EFFECT OF GRAIN SOAKING OF SOME NEW LONG SPIKE WHEAT VARIETIES IN ZINC AND NITROGEN FERTILIZATION AT SOUTH SINAI."

BY

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ABSTRACT

Two field experiments were conducted at Ras-sudr of soil and highly salinity. Brackish nature water was used in irrigation. The experiments were carried out over two successive seasons, 2002/2003 and 2003/2004 to investigate the effect of three wheat varieties (Sids 7, Sakha 202 and Sakha 204) and presoaking seeds in zinc seeds in,(0.04%, 0.06%,and tap water), and three nitrogen fertilizer levels (80, 100 and 120 kg N/fed) on some growth characters, yield and its components and grain and straw chemical compositions . A spilt split plot design was used.

Results summarized as follows.

1. There were obtained remarkable increase among wheat varieties with growth characters, yield and its components and chemical composition Sids 7 was surpassed the other two varieties with all characters.
2. It was found that presoaking grain zinc sulfate treatment (tap water, 0.04% and 0.06% $ZnSo_4$) had a significant increases on growth characters, yield and its components and chemical contents. Greatest values of the studied traits were obtained by soaking grains in high concentration of zinc sulphate 0.06%.
3. Increasing nitrogen fertilization from 80 up to 120 Kg N/fed caused gradually increases all the studied traits.
4. Results also indicated that growth characters, yield and its components as well as mineral and chemical contents in grain and straw increased significantly by using interaction treatments between the three studied factors.

The highest values ware obtained by Sids 7 wheat variety, soaking zinc (0.06%) as zinc sulphate and nitrogen fertilization at the rate of 120 kg N /fed.

INTRODUCTION

Wheat (*Triticum aestivum*, L.) is one of the most important cereal crop in terms of area and production. Also, it is considered the first leads cereal crop in the world due to its position as a staple food for the majority of the world population. In Egypt, Wheat is the most important food crop and provides almost 35% of the total food calories of the Egyptian people. Regarding wheat varietal differences, many workers found significant difference between wheat varieties in growth trait and yield and its components. In this respect, El-Sayed *et al.* (2000) found that the tested wheat cultivars Gemmeiza 5, 7 and 9 showed significant variations in all studied traits, Gemmeiza 9 surpassed the other two cultivars in no. of spikes/m^2, no. of grains/ spike, grain weight/spike, 1000 – grain weight, grain and straw yields/fed, followed by Gemmeiza 7, while Gemmeiza 5 recorded the lowest values.

Application of nitrogen fertilizer is required for efficient wheat production particularly in arid and semiarid zone when the amount of available nitrogen in the soil is considered to be very low compared to the relatively very height amount nitrogen requirement of the crop, Sawires (2000) mentioned that application of 100kg N/fed gave the tallest wheat plants and highest values of no. of

tillers and spikes/plant, no. of grains/ spike, grain weight/spike, 1000 grains weight, grain and straw yields/fed., the increase in grain and straw yields/fed amounted to 25.0 and 38.84% respectively by application of 100kg N/fed. Than those received 40kg N/fed.

Also the normal concentration Zn ranges between 150 to 250 ppm in the plant dry matter. Deficiencies occur when the level drop below 20 ppm and toxicities will occur when Zn in leaves exceed 400 ppm. Plant roots absorber Zn as a component of synthetic and material complexes. Soluble Zn salts and Zn complexes can also enter the plant system direction through leaves. Zn in not definitely know whether it acts as a functional structural, or regulatory cofactor.

The objective of this study was to investigate the effect of wheat varieties, zinc grain soaking and nitrogen fertilizer on the wheat productivity and chemical contents under highly calcareous soil and saline irrigation water at South Sinai conditions.

MATERIAL AND METHODS

Two successive field experiments ware carried out during 2002/2003 and 2003/2004 growing seasons in the Desert Research Center experimental station at Wadi-Sudr, South Sinai Governorate. The soil texture was sandy loam having an alkaline reaction, results of soil analysis samples collected before treatments application are reported in Table (1). The soil is characterized by 52.0% $CaCo_3$, moderately saline (11.78 EC ds/m), mildly reaction (PH = 7,35), A brackish – well water, with total soluble salts of about 3791 ppm in the average, is the main source of irrigation. Each experiment included 27 treatments which were the combination of three wheat varieties, three zinc treatment and three nitrogen rates as follows:

a. Wheat varieties.

1- Sids 7 2- Sakha 202 3- Sakha 204.

b. Zinc soaking:

1- top water (control)., 0.04% and 0.06% as Zinc sulphate

c. Nitrogen rates (kg/fed).

1- 80 kgN/fed. 2- 100 kgN/fed. 3- 120 kgN/fed.

Nitrogen fertilizer was applied in four equal doses (at swing time, tillaring stage, elongation stage and booting stage).

Split split plot design with four replicates was used. The varieties were allocated to the main plats, Zinc soaking treatment were randomly distributed in the sub-plots, while N rates were allocated at random to the sub-sub plots, the sub – sub plot was 5 m^2 (2.5 x 2.0 m). The general agricultural practices were used for seeding the wheat crop, where organic manure (20 m^3/fed) and calcium super phosphate fertilizer (P_2O_5) at the rate of 30 kg p_2o_5/fed were added at the preparation the soil with rater. Respectively, Wheat grains were sown at the rate of 100kg/fed. On 6th November in both seasons. After 80 days from sowing, 5 plants from the inner rows of used to determine the following characters .

1- Plant height (cm).
2- Number of leaves/Plant.
3- Plant dry weight (g.).
4- Leaf area index (L.A.I).

At harvest, the following data were obtained.

1- Number of spike/m^2
2- Spike length (cm).
3- Spike grains weight (g.).
4- Number of spikelets /spike.
5- Number of grains/Spike.
6- 1000 grain weight (g.).
7- Grain yield (ton/fed).
8- Straw yield (ton/fed).
9- Biological yield (ton/fed).

Chemical analysis of shoots and grains at harvest. The acid digests of the dried powdered materials were analyses for K using Flame – Photometer, total nitrogen content was expressed as crude protein by multiplying the total nitrogen by 5.9. Total carbohydrate content was determined according to the method adopted by Dubois *et al.* (1951).

Table (1): physical and chemical properties of the experimental soil at Ras Sudr Research Station in 2002/2003 and 2003/2004

A. Physical analysis :

Soil depth (Cm)	Particle size distribution (%) Coarse sand 2-0.02	fine sand .2-.02	Silt 0.02-0.002 mm	Clay <0.002 mm	Textural class
			2002/2003		
0-30	38.31	41.52	10.38	9.79	Sandy loam
30-60	37.25	42.73	12.35	7.67	Sandy loam
			2003/2004		
0-30	47.92	34.92	5.98	11.18	Sandy loam
30-60	26.82	60.01	5.13	8.04	Sandy loam

B. Chemical analysis

	pH	EC (dS/m)	Soluble cations (me/L)				Soluble anions (me/L)				$CaCO_3$ (%)
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	HCO_3	Cl^{-}	SO_4	O.M. (%)	
	2002/2003										
0-30	7.25	11.78	42.41	14.14	58.39	1354	3.44	33.1	79.98	0.18	54.79
30-60	7.35	10.35	39.26	13.09	47.71	1.34	3.88	39.8	59.15	0.12	50.24
	2003/2004										
0-30	7.89	10.2486	37.85	12.29745	50.7993	1.34	2.993	28.8	69.583	0.1566	54.8
30-60	8.03	9.0045	36.08	11.386125	41.5077	1.166	3.376	34.6	51.461	0.1044	48.15

Table (2): Chemical analysis of the applied irrigation water at every irrigation time.

No. of Irrigation	pH	EC (dS/m)	Soluble cations (me/L)				Soluble anions (me/L)			
			Ca++	Mg^{++}	Na^{+}	K^{+}	HCO_3	Cl^{-}	SO_4^{-}	TDS ppm
First	7.9	5.73	14.16	10.4	32.14	0.78	51.12	1.72	4.64	3667
Second	7.9	5.82	13.04	11.02	33.46	0.72	51.67	1.64	4.94	37.25
Third	7.9	5.71	12.53	11.56	32.19	0.69	51.14	1.48	4.47	3654
Fourth	7.9	5.86	12.62	11.45	33.81	64	53.61	1.65	3.28	3750
Fifth	8	5.98	13.48	11.38	34.54	0.48	54.01	1.54	4.36	3827
Sixth	8	6.04	17.2	11.44	31.25	0.58	54.12	1.72	4.68	3866
Seventh	8	6.32	17.32	14.49	31.02	0.42	57.63	1.89	3.78	1045

Table (3): Meteorological data of temperature (C), relative humidity (%), and precipitation on Wadi Sudr , South Sinai Governorate:

Growing methods	Temperature (C)			Relative Humidity (%)	Wind Sppeed (km/h)	Precipitation (mm)
	Max	Min	Mean			
Growing seasons 2002 /2003						
November	26.1	14.5	20.3	64	11.6	0
December	22.2	10	16.1	58	6.1	15
January	21	8.5	14.8	62	6.2	25
February	19.5	7.5	13.5	52	2	22
March	22.2	9.6	15.9	53	5.8	22
April	26.3	12.4	19.4	46	4.2	8
Growing seasons 2003 /2004						
November	26	13.7	19.9	61	11	0
December	21	10	15.5	60	6.3	16
January	20.1	8.3	14.2	60	3.6	25
February	21.1	9.5	15.3	61	6	19
March	23.1	10.7	16.9	51	6.8	15
April	19.6	14.8	22.2	47	9	3

The analysis of variance was carried out in combined analysis for two seasons according to procedure outlined by Steel and Torrie (1960). The differences among means were tested using New L. S. D. at the level of 0.05 according to Waller and Duncan (1969).

RESULTS AND DISCUSSION

I Growth characters

1- Effect of Wheat varieties

Data in Table (4) showed that the three wheat varieties significantly differed throughout the studied growth characters i.e.: plant height, no. of leaves/plant, plant dry weight and L.A.I. Sids 7 showed superior as compared with Sakha 202 and Sakha 204, respectively, these results may be tended to higher resistance of Sids 7 wheat variety to salinity as compared with the other two wheat varieties, their germination were reduced in response of high salt concentration which reflected on their growth under such conditions. These results are in agreement with those obtained by El-Sayed *et al.* (2002) who reported that tested wheat varieties Gemeiza 5, 7 and 9 showed significant difference with all the studied characters. Gemeiza 9 surprised difference in the other two varieties and Sharran *et al.* (2000).

2- Effect of Zinc soaking

The effect of wheat grain soaking in different concentrations of Zinc are showed in Table (4) results indicated that the studied characters were gradually increasing by soaking wheat grains in zinc sulphate from zero up to 0.06% .Values of plant height (cm), No. of leaves/plant, plant dry weight (g) and LAI reached to (90.59 & 1837 & 4.13 and 4.33) respectively, when wheat seeds soaking 0.06% Zn solion as compared with the tap water treatment (87.01 & 17.62 & 4.03 and 3.71). These results may be due to Zn is generally involved in the activation of various enzyme systems which in turn encouraged building up the photosynthetic area, reflected on growth stimulation (Tisdale and Nelsen, 1978). Similar results were obtained by Redjaguisguk *et al.* (1998) and Qiong (2004).

3-Effect of Nitrogen fertilization

The date presented in Table (4) showed that increasing nitrogen fertilization from 80 to 100 and 120 kg N/fed caused gradually increasing in the growth characters, which reached to maximum values (90.96& 18.49& 4.23 and 4.13) for plant height, number of leaves/plant, plant dry. weight and LAI, respectively, by adding 120 kgN/fed,

these results may be due to the favorable effect of nitrogen fertilization and explain the role of nitrogen in encouraging metabolic processes in wheat plants consequently their growth, spike invitation and grain filling is responsible for the increase of growth characters. Similar results were obtained by Sawires (2000), Saleh (2002) and Camara *et al.* (2003).

4- The interaction between the studied factors

The data in Table(4) showed that the interaction between the three wheat varieties and zinc soaking had a significant effect on the studied growth characters, the highest measuring were obtained by using the interaction between wheat side 7 variety with zinc soaking 0.06%.

Also, it can be noticed that the interaction between Sids 7 variety and application of 120 kg N/fed lead to obtain the greatest growth characters values. The same trend of the previous results were obtained by Sharaan and Abd El – Samie (1999).

Soaking Zn at the concentration of 0.06% with adding 120 kg N/fed treatment gave the highest significant effect and resulted the highest values of the studied growth characters (Table 4).

The interaction between wheat varieties, zinc soaking and nitrogen rates had a significant effect on. growth characters (Table 4). The highest values were produced as used the interaction between Sids 7 variety with 0.06% zinc sulphate soaking and 120kg N/fed rate. On the contrary, the lowest values were obtained from Sakha 202 with soaking in tap water and 80 kg N/fed rate interaction treatment. Similar result were obtained by Chaudhry and Loneragan (1999), Sharaan and Abd El-Samei (1999) and Staggenborg *et al.* (2003).

II -Yield and its components

1- Effect of wheat varieties:

Data presented in Table (5), showed that the three wheat varieties significantly affected on yield and its components. Sids 7 variety showed superiority in all the studied characters as compared with Sakha 202 and 204, respectively. This may be attributed to the differences among the studied varieties in yield genital constitution, the results of varietal differences in the above mentioned studied traits are in agreement with those reported by Abdel Maksoud.(2000),and El. Sayed *et al.* (2000).

2- Effect of Zinc soaking

The effect of grain soaking in different concentration of zinc sulphate levels on yield and its components of wheat are shown in Table (5) Results indicated that presoaking grain treatments had significantly increased No. of spike/m^2, spike length, spike grain weight, NO. of spikelets/spike, No. of grains/ spike, 1000-grain weight,, grain, straw yield and. biological yields/fed

The abovementioned characters gradually increased as a result of increasing levels zinc concentrations (zero (tap water), 0.04% and 0.06%). The highest zinc soaking (0.06%) had the highest results on increasing all the studied traits.

3- Effect of Nitrogen fertilization:

Nitrogen application at the rate of 120 kg N/ fed. caused the highest increase in no. of spike/m^2 spike length (cm). spike grain weight (g.), no. spikelets and grains/spike, 1000-grain weight (g), (ton/fed), grain, straw and biological yields (ton/fed), which reached to (253.95& 19.75& 1.974& 19.42& 46.39& 41.37& & 2.106,4.457 and6.58), respectively. the abovementioned results under saline irrigation water may be attributed to the role of nitrogen which led to increment of amino acids, enzymes and some growth regulators such as auxine contents as affected by the increasing of nitrogen as recorded by Salem *et al.* (1990), Barsoum (1994) and Saleh (2002).

4- The interaction between the studied factors:

Data in Table (5) show significant effect of the interaction between the three wheat varieties and soaking zinc levels for yield and its components. It was noticed that the interaction treatment between soaking zinc (0.06%) and Sids 7 was the best treatment for yield and its components. Similar previous result were detected by Chaudhry and Loneragan (2000).

Table (4): Effect of grain soaking of some new wheat varieties in Zinc and nitrogen fertilization on growth characters (combined analysis 2002/2003 and 2003/2004 growing seasons)

Varieties / Traits		Plant height (cm)				No. of leaves/Plant				Plant dry weight (g)				Leaf area index (L.A.I)			
	Znic	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean
V1	Zn1	85.95	87.45	89.34	**87.57**	17.37	17.86	18.63	**17.95**	4.01	4.09	4.13	**4.07**	3.65	3.77	4.06	**3.77**
	Zn2	87.20	88.29	92.93	**89.48**	17.55	18.10	18.62	**18.08**	4.17	4.22	4.26	**4.22**	4.04	4.13	4.21	**4.12**
	Zn3	88.03	92.51	98.99	**92.99**	18.69	19.04	18.84	**19.19**	4.31	4.42	4.55	**4.43**	4.31	4.41	4.50	**4.41**
	Mean	**87.06**	**89.42**	**90.01**	**90.01**	**17.86**	**18.33**	**19.03**	**18.41**	**4.16**	**4.25**	**4.31**	**4.24**	**4.00**	**4.11**	**4.20**	**4.10**
V2	Zn1	82.92	85.87	86.00	**86.00**	16.91	17.84	18.24	**17.66**	3.94	4.01	4.08	**4.01**	3.56	3.68	3.78	**3.67**
	Zn2	85.92	87.56	87.58	**87.58**	18.05	17.95	18.65	**18.22**	4.08	4.14	4.20	**4.14**	3.91	4.03	4.11	**4.02**
	Zn3	85.94	91.25	89.13	**89.13**	17.64	18.07	18.88	**18.13**	4.21	4.27	4.32	**4.26**	4.20	4.29	4.39	**4.29**
	Mean	**85.59**	**88.22**	**87.57**	**87.57**	**17.53**	**17.95**	**18.52**	**18.00**	**4.08**	**4.14**	**4.20**	**4.14**	**3.89**	**4.00**	**4.09**	**3.99**
V3	Zn1	86.00	88.91	87.46	**87.46**	17.31	17.04	17.45	**17.26**	3.98	4.02	4.06	**4.02**	3.59	3.68	3.82	**3.69**
	Zn2	88.69	90.44	91.64	**90.27**	17.66	17.17	17.89	**17.58**	4.11	4.15	4.19	**4.15**	3.95	4.05	4.16	**4.05**
	Zn3	88.71	88.17	92.06	**89.65**	17.21	17.81	18.37	**17.80**	4.20	4.24	4.27	**4.23**	4.25	4.30	4.35	**4.30**
	Mean	**87.80**	**89.17**	**90.40**	**89.12**	**17.39**	**17.34**	**17.91**	**17.55**	**4.09**	**4.14**	**4.17**	**4.13**	**3.92**	**4.01**	**4.11**	**4.01**
Mean	Zn1	84.95	87.41	88.67	**87.01**	17.19	17.58	18.11	**17.62**	3.98	4.04	4.09	**4.03**	3.60	3.71	3.83	**3.71**
	Zn2	87.27	88.77	91.30	**89.11**	17.75	17.74	18.39	**17.96**	4.12	4.17	4.22	**4.17**	3.96	4.07	4.16	**4.06**
	Zn3	88.23	90.64	91.90	**90.59**	17.85	18.30	18.97	**18.37**	4.24	4.31	4.38	**4.13**	4.25	4.33	4.41	**4.33**
	Mean	**86.82**	**88.94**	**90.96**		**17.60**	**17.87**	**18.49**		**4.11**	**4.17**	**4.23**		**3.94**	**4.03**	**4.13**	

L.S.D

V = 1.037	VxZn=1.011	V = 0.418	VxZn=1.018	V = 0.018	VxZn=0.082	V = 0.112	VxZn=0.089
Zn = 1.028	VxN=1.003	Zn = 0.715	VxN=1.004	Zn =0.182	ZnxN=0.081	Zn =0.099	ZnxN=0.112
N = 1.009	NxV=1.007	N = 0.184	ZnxN=1.008	N = 0.114	NxV=0.084	N = 0.142	NxV=0.104
VxZn xN=NS		VxZn xN=0.981		VxZn xN=0.019		VxZn xN=0.163	

v1=sids7
v2=sakha202
v3=sakha204

zn1=tap water
zn2=0.04% znso4
zn3=0.06%znso4

N1=80kg n/fed
N2=100kg n/fed
n3=120kg n/fed

Table (5): Effect of grain soaking of some new wheat varieties in Zinc and nitrogen fertilization on yield and its components (combined over 2002/2003 and 2003/2004 growing seasons)

Traits / Varieties		No. of spike/m2				Spike length (cm)				No. of grains/spike				No. of spiklets/spike			
	Znic	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean
V1	Zn1	235	239	243	**239**	12.79	14.09	15.49	**14.12**	10.9	42.4	43.6	**42.3**	18.22	18.5	18.72	**18.5**
	Zn2	248	254.4	261	**254**	17.6	19.16	20.44	**19.07**	45.2	47	48.6	**46.9**	19.31	19.7	20.08	**19.7**
	Zn3	265	271.6	279	**272**	21.32	22.7	24.16	**22.72**	50.5	51.7	53.1	**51.7**	20.59	21.5	22.22	**21.4**
	Mean	**249**	**255**	**261**	**255**	**17.24**	**18.65**	**20.03**	**18.64**	**45.5**	**47**	**48.4**	**47**	**19.37**	**19.9**	**20.34**	**19.9**
V2	Zn1	227	232.9	238	**232**	13.22	14.79	15.91	**14.64**	38.5	39.8	41	**39.8**	19.39	17.6	17.81	**17.6**
	Zn2	242	247.4	254	**248**	17.38	18.49	20.1	**18.66**	42.3	44.2	45.9	**44.1**	18.18	18.8	19.35	**18.8**
	Zn3	259	263	267	**263**	21.06	22.23	23.45	**22.25**	46.8	48.1	49.6	**48.1**	19.75	20.1	20.32	**20.1**
	Mean	**243**	**247.7**	**253**	**248**	**17.22**	**18.5**	**19.82**	**18.51**	**42.5**	**44**	**45.4**	**44**	**18.44**	**18.8**	**19.16**	**18.9**
V3	Zn1	221	226.7	233	**227**	13.68	14.8	15.96	**14.81**	38.1	39.8	41.4	**39.8**	16.63	17	17.63	**17.1**
	Zn2	278	242.9	248	**243**	17.03	18.23	19.41	**18.23**	42.7	43.8	45.4	**44**	18.07	18.5	18.89	**18.5**
	Zn3	252	257.3	263	**257**	20.73	21.81	22.83	**21.79**	46.7	47.8	49.1	**47.8**	19.16	19.6	19.73	**19.5**
	Mean	**237**	**242.3**	**248**	**242**	**17.15**	**18.28**	**19.4**	**18.28**	**42.5**	**43.8**	**45.3**	**43.9**	**17.95**	**18.3**	**18.75**	**18.3**
Mean	Zn1	227	232.9	238	**233**	13.23	14.56	15.79	**14.52**	40	40.7	42	**40.6**	17.41	17.7	18.05	**17.7**
	Zn2	243	248.2	253	**249**	17.33	18.63	19.98	**18.65**	34.4	45	46.6	**45**	18.52	19	19.44	**19**
	Zn3	260	264	270	**364**	21.04	22.24	23.48	**22.25**	48	49.2	50.6	**49.2**	19.84	20.4	20.76	**20.3**
	Mean	**243**	**248.3**	**254**		**17.2**	**18.48**	**19.75**		**43.5**	**45**	**46.4**		**18.59**	**19**	**19.42**	

L.S.D

V = 4.182	VxZn=4.130	V = 0.112	VxZn=0.148
Zn = 4.103	ZnxN=3.982	Zn = 0.118	VxN=0.140
N = 4.164	NxV=3.906	N = 0.146	NxV=0.133
VxZn xN=4.144		VxZn xN=0.144	

V = 0.140	VxZn=2.18	V =1.002	VxZn=1.008
Zn = 2.082	VxN=2.092	Zn =0.989	ZnxN=1.018
N = 2.119	ZnxN=2.114	N = 1.007	NxV=1.011
VxZn xN=2.221		VxZn xN=1.022	

Table (5): Cont-

Traits / varieties		Spike grain weight (g)				1000-grain weight (g.)				Grain yield (Ton/fed				Strow yield (Tonl fed)				Biological yield (ton/fed)			
	Znic	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean
V1	Zn1	1.56	1.652	1.72	**1.64**	40.45	40.59	40.94	**40.66**	1.54	1.66	1.75	**1.65**	3.224	3.48	3.678	**3.46**	4.758	5.141	5.43	**5.109**
	Zn2	1.8	1.906	1.98	**1.85**	41.59	41.87	42.13	**41.86**	1.88	2.04	2.2	**2.04**	3.961	4.28	4.655	**4.3**	5.836	6.315	6.81	**6.338**
	Zn3	2.13	2.225	2.31	**2.22**	42.54	42.85	43.24	**42.88**	2.37	2.58	2.71	**2.55**	5.006	5.27	5.685	**5.32**	7.376	7.803	8.392	**7.758**
	Mean	**1.86**	**1.928**	**2**	**1.92**	**41.53**	**41.77**	**42.1**	**41.8**	**1.93**	**2.09**	**2.22**	**2.08**	**4.064**	**4.34**	**4.673**	**4.36**	**5.991**	**6.419**	**6.894**	**6.435**
V2	Zn1	1.46	1.571	1.67	**1.57**	39.67	40.14	40.5	**40.1**	1.36	1.5	1.67	**1.51**	2.887	3.15	3.504	**3.18**	4.251	4.654	5.172	**4.692**
	Zn2	1.78	1.879	1.98	**1.88**	40.62	40.68	41.23	**40.84**	1.81	1.95	1.99	**1.92**	3.808	4.1	4.445	**4.12**	5.623	6.051	6.562	**6.078**
	Zn3	2.08	2.18	2.28	**2.18**	41.59	41.93	42.13	**41.88**	2.26	2.41	2.55	**2.41**	4.745	5.66	5.353	**5.05**	6.749	7.681	7.904	**7.372**
	Mean	**1.77**	**1.877**	**1.98**	**1.88**	**40.63**	**40.91**	**41.29**	**40.94**	**1.81**	**1.95**	**2.07**	**1.95**	**3.813**	**4.1**	**4.434**	**4.12**	**5.541**	**6.056**	**6.54**	**6.048**
V3	Zn1	2.42	1.494	1.61	**1.5**	39.04	39.57	39.92	**39.51**	1.28	1.4	1.56	**1.42**	2.689	2.98	3.292	**2.99**	3.97	4.393	4.86	**4.407**
	Zn2	2.11	1.864	2.93	**1.86**	40.09	40.28	40.7	**40.35**	1.71	1.89	2.07	**1.89**	3.591	3.96	4.355	**3.97**	5.301	5.846	6.449	**5.865**
	Zn3	2.08	2.164	2.22	**2.16**	40.97	41.31	41.55	**41.28**	2.19	2.32	2.45	**2.32**	4.607	4.87	5.142	**4.88**	6.801	7.201	7.589	**7.197**
	Mean	**1.73**	**1.841**	**1.94**	**1.84**	**40.03**	**40.38**	**40.72**	**40.38**	**1.73**	**1.88**	**2.03**	**1.88**	**3629**	**3.94**	**4.263**	**3.94**	**5.357**	**5.813**	**6.299**	**5.823**
Mean	Zn1	1.47	1.572	1.67	**1.57**	39.72	40.49	40.45	**40.09**	1.39	1.53	1.66	**1.53**	2.933	3.2	3.491	**3.21**	4.326	4.729	5.154	**4.736**
	Zn2	1.77	1.883	1.99	**1.88**	40.6	40.86	41.15	**41.02**	1.8	1.96	2.09	**1.95**	3.786	4.11	4.485	**4.13**	5.587	6.07	6.624	**6.094**
	Zn3	2.1	2.189	2.27	**2.19**	41.69	42.03	42.31	**42.01**	2.27	2.47	2.57	**2.43**	4.786	5.07	5.394	**5.08**	6.976	7.489	7.961	**7.307**
	Mean	**1.78**	**1.882**	**1.97**		**40.73**	**41.02**	**41.37**		**1.82**	**1.97**	**2.11**		**3.835**	**4.13**	**4.457**		**5.629**	**6.096**	**6.58**	

L.S.D

V =0.127	VxZn=0.128	V = 0.981	VxZn=1.014	V =0.082 VxZn=0.093 V=0.084 VxZn=0.088 V =1.004 VxZn=1.004
Zn =0.134	VxN=0.243	Zn = 1.002	VxN=1.098	Zn =0.080 VxN=0.094 Zn=0.094 VxN= 0.084 Zn =1.018 VxN=1.000
N = 0.142	ZnxN=0.244	N = 0.993	ZnxN=1.093	N = 0.089 ZnxN=0.090 N=0.090 Zn x N= 0.093 N = 1.009 ZnxN=1.018
	VxZn xN=0.208		VxZn xN=1.112	VxZn xN=0.094 V x Zn x N= 0.098 VxZn xN=1.082

With respect to the interaction between the three wheat varieties and nitrogen fertilization levels (Table 5), the result shows that the best interaction treatment (Side 7,120 kg N/fed) for yield and its components. The favourable effects of the interaction between applying nitrogen and wheat varieties may be due to water and minerals uptake at such relatively height level of stress (El. Gizawy, 20005).

The interaction between the three wheat varieties, Zinc soaking and nitrogen fertilization had significant effects on yield and its components were produced by Sids 7 variety, zinc sulphate soaking (0.06%) and 120 kg N/fed levels interaction treatment. On the other hand, the lowest values were obtained from Sakha 202, soaking in tap water and 80 kg N/fed . Similar results were obtained by Sharaan and Abdel – Samie (1999), Staggenborg *et al.* (2003) and El.Gizawy (2005).

The interaction between soaking zinc sulphate and nitrogen fertilization had a significant effects on yield and its components (Table 5), the highest values of yield and its components were produced by applying zinc sulphate (0.06%) with nitrogen level (120 kg N/ fed) treatment. While the lowest values was obtained from 80 kg N/fed. with soaking in tap

III-Chemical components:

Data in Table (6) showed that the three wheat verities had a significant effect on chemical content in grain and straw. The highest values were obtained by using Sids 7. Concerning to grain chemical contents similar results were obtained with protein and carbohydrate.

The results in Table (6) show that wheat seeds soaked in 0.06% zinc solution treatment gave the highest chemical content values in grain and straw . The same trained was obtained for protein and carbohydrate in grains

Data in Table (6) showed that there were a progressive and consistent increase in protein and carbohydrate contents in grains by adding nitrogen from 80 up to 120 kg N/fed. The same trends was obtained with mineral contents in grain and straw.

Also the three wheat varieties had a significant effect with mineral content by soaking zinc.0.06% Zn concentration had the highest values in grain and straw mineral contents as well as protein and carbohydrate contents in grain as shown Table (6).

With, respect to the interaction between varieties and nitrogen application, the results (Table 6) indicated that the highest chemical contents each of grain and straw were obtained by adding Sids 7 variety and nitrogen fertilizer120kg/fed interaction treatment . Also, carbohydrate and protein in grains reached to their maximum values by adding the same interaction treatment.

The interaction between wheat grain soaking in zinc and nitrogen fertilizer had a significant effects on chemical contents were produced by Sids 7 variety, zinc sulphate soaking (0.06%) and 120 kg N/fed levels interaction treatment. Also, protein and carbohydrate contents in grain reached to their maximum values by adding the same interaction treatment.

The data in Table (6) indicated that the two and three interactions between the studied factors had a significant effect on mineral contents in grain and straw, Also the same results were obtained with carbohydrate and protein contents in grains. The highest contents were obtained by using Sids 7 wheat variety, soaking zinc sulphate 0.06% and nitrogen fertilization 120 Kg N/fed.

Table (6): Effect of grain soaking of some new wheat varieties in Zinc and nitrogen fertilization on chemical composition (combined over 2002/2003 and 2003/2004 growing seasons)

Traits / Varieties		Grain (N%) content				Grain (P%)Content				Grain (K%) Content				Grain (Zn ppm) Content			
	Znic	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean
V1	Zn1	1.93	2.076	2.23	**2.08**	0.241	0.253	0.257	**0.251**	0.34	0.36	0.37	**0.35**	207.5	253	277.1	**246**
	Zn2	2.33	2.441	2.55	**2.44**	0.27	0.276	0.285	**0.278**	0.37	0.39	0.39	**0.39**	304.8	333	359.8	**333**
	Zn3	2.65	2.758	2.81	**2.74**	0.294	0.301	0.305	**0.299**	0.4	0.41	0.41	**0.4**	368.5	376	427	**382**
	Mean	**2.3**	**2.425**	**2.53**	**2.42**	**0.269**	**0.278**	**0.283**	**0.278**	**0.37**	**0.38**	**0.39**	**0.38**	**285**	**321**	**354.6**	**320**
V2	Zn1	1.9	2.056	2.16	**2.04**	0.238	0.243	0.247	**0.242**	0.34	0.35	0.36	**0.35**	174.6	201	224.8	**200**
	Zn2	2.24	2.366	2.45	**2.35**	0.254	0.264	0.275	**0.264**	0.37	0.38	0.38	**0.38**	266.3	284	300.2	**283**
	Zn3	2.54	2.556	2.64	**2.58**	0.289	0.291	0.293	**0.282**	0.39	0.4	0.4	**0.4**	332.1	363	393.7	**363**
	Mean	**2.23**	**2.326**	**2.41**	**2.32**	**0.257**	**0.265**	**0.269**	**0.263**	**0.36**	**0.37**	**0.38**	**0.37**	**257.6**	**283**	**306.3**	**282**
V3	Zn1	1.89	1.961	2.04	**1.96**	0.237	0.244	0.245	**0.242**	0.34	0.35	0.36	**0.35**	194.5	235	269.5	**233**
	Zn2	2.15	2.278	2.37	**2.27**	0.25	0.259	0.264	**0.258**	0.37	0.38	0.38	**0.37**	292.1	303	327.9	**308**
	Zn3	2.46	2.58	2.64	**2.56**	0.273	0.275	0.28	**0.276**	0.39	0.4	0.4	**0.34**	352.1	380	415.4	**382**
	Mean	**2.17**	**2.273**	**2.35**	**2.26**	**0.264**	**0.266**	**0.269**	**0.253**	**0.36**	**0.37**	**0.38**	**0.37**	**279.6**	**306**	**337.6**	**308**
Mean	Zn1	1.91	2.031	2.14	**2.03**	0.239	0.247	0.25	**0.245**	0.34	0.35	0.36	**0.35**	192.2	230	257.1	**226**
	Zn2	2.24	2.361	2.45	**2.33**	0.258	0.267	0.275	**0.267**	0.37	0.38	0.39	**0.38**	287.8	307	329.3	**308**
	Zn3	2.55	2.632	2.69	**2.63**	0.283	0.288	0.293	**0.281**	0.39	0.4	0.41	**0.4**	342.2	373	412	**376**
	Mean	**2.23**	**2.341**	**2.43**		**0.26**	**0.267**	**0.27**		**0.37**	**0.38**	**0.38**		**274.1**	**303**	**332.8**	
L.S.D		V = 0.012	VxZn=0.022			V = 0.008	VxZn=0.019			V =0.018	VxZn=0.021			V =24.21	VxZn=28.24		
		Zn = 0.018	VxN=0.02			Zn = 0.012	VxN=0.018			Zn =0.012	VxN=0.024			Zn =21.88	VxN=26.20		
		N = 0.017	ZnxN=0.03			N = 0.017	ZnxN=0.20			N = 0.015	ZnxN=0.023			N = 22.74	ZnxN=25.25		
		VxZn xN =.032				VxZn xN = 0.041				VxZn xN = 0.04				VxZn xN = 23.44			

Table (6): Cont-

Traits / varieties		Straw (N%) content				Straw (P%) content				Straw (K%) content				Straw (Zn ppm) content			
	Znic	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean	N1	N2	N3	Mean
V1	Zn1	0.44	0.467	0.55	**0.49**	0.132	0.146	0.15	**0.144**	3.25	3.4	3.54	**3.4**	121.9	148	173.8	**148**
	Zn2	0.6	0.664	0.69	**0.65**	0.165	0.167	0.174	**0.168**	3.63	3.8	3.93	**3.79**	195.5	238	282.4	**239**
	Zn3	0.74	0.756	0.77	**0.75**	0.178	0.179	0.182	**0.179**	4.08	4.19	4.27	**4.18**	345.6	393	439.5	**393**
	Mean	**0.59**	**0.629**	**0.67**	**0.63**	**0.158**	**0.164**	**0.17**	**0.164**	**3.66**	**3.8**	**3.91**	**3.79**	**221**	**260**	**298.6**	**260**
V2	Zn1	0.43	0.47	0.53	**0.48**	0.131	0.145	0.154	**0.143**	3.14	3.28	3.47	**3.29**	125.7	153	175.9	**152**
	Zn2	0.56	0.616	0.67	**0.62**	0.156	0.162	0.166	**0.161**	3.6	3.69	3.79	**3.69**	198	224	262	**228**
	Zn3	0.69	0.71	0.72	**0.7**	0.169	0.172	0.177	**0.172**	3.89	4.01	4.09	**3.99**	301.3	352	373.5	**342**
	Mean	**0.56**	**0.598**	**0.64**	**0.6**	**0.152**	**0.16**	**0.166**	**0.159**	**3.55**	**3.66**	**3.79**	**3.66**	**208.3**	**243**	**270.5**	**240**
V3	Zn1	0.44	0.468	0.54	**0.48**	0.131	0.144	0.146	**0.14**	3.15	3.28	3.36	**3.26**	119.3	147	170.8	**241**
	Zn2	0.57	0.639	0.68	**0.63**	0.154	0.157	0.16	**0.157**	3.55	3.69	3.81	**3.68**	190.2	217	258.7	**146**
	Zn3	0.7	0.718	0.73	**0.71**	0.165	0.169	0.172	**0.169**	3.92	4.03	4.11	**4.03**	286.8	329	359.2	**222**
	Mean	**0.57**	**0.608**	**0.65**	**0.61**	**0.15**	**0.156**	**0.159**	**0.155**	**3.54**	**3.67**	**3.76**	**3.65**	**198.7**	**231**	**262.8**	**325**
Mean	Zn1	0.44	0.468	0.54	**0.48**	0.132	0.145	0.152	**0.143**	3.18	3.32	3.46	**3.32**	122.3	149	173.5	**231**
	Zn2	0.58	0.639	0.68	**0.63**	0.158	0.162	0.164	**0.162**	3.59	3.73	6.84	**3.72**	194.6	226	267.7	**230**
	Zn3	0.71	0.706	0.74	**0.72**	0.171	0.173	0.177	**0.173**	3.96	4.08	4.16	**4.07**	311.2	358	390.7	**353**
	Mean	**0.57**	**0.574**	**0.65**		**0.153**	**0.159**	**0.165**		**3.58**	**3.71**	**3.82**		**209.3**	**244**	**277.4**	

L.S.D								
	V =0.018	**VxZn=0.028**	**V =0.018**	**VxZn=0.032**	**V =0.024**	**VxZn=0.044**	**V =54.84**	**VxZn=50.14**
	Zn =0.024	**VxN=0.034**	**Zn =0.027**	**VxN=0.037**	**Zn =0.038**	**VxN=0.036**	**Zn =64.87**	**VxZn=59.13**
	N =0.032	**ZnxN=0.030**	**N =0.038**	**ZnxN=0.038**	**N = 0.041**	**ZnxN=0.024**	**N = 67.13**	**ZnxN=62.44**
	VxZn xN= 0.04		**VxZn xN =0.04**		**VxZn xN= 0.05**		**VxZn x N=61.17**	

Table(6): Cont-

Traits / Varieties	Znic	Grain crud protein (%)				Grain total carbohydrate (%)			
		N1	N2	N3	Mean	N1	N2	N3	Mean
V1	Zn1	11.4	12.52	12.8	**12.3**	68.27	68.89	69.55	**68.9**
	Zn2	13.2	13.64	14.5	**13.9**	70.39	71.15	71.74	**71.12**
	Zn3	15.5	15.72	16.2	**15.8**	72.25	72.77	73.23	**72.75**
	Mean	**13.4**	**13.96**	**14.5**	**14.7**	**70.33**	**70.94**	**71.51**	**70.87**
V2	Zn1	11.4	11.63	12.7	**11.9**	68.25	68.67	69.45	**68.78**
	Zn2	13.2	13.85	14.6	**13.9**	70.19	70.61	71.15	**70.65**
	Zn3	15.7	15.65	15.8	**15.6**	71.82	72.27	72.45	**72.17**
	Mean	**13.2**	**13.71**	**14.4**	**13.6**	**70.06**	**70.52**	**71.02**	**70.53**
V3	Zn1	11.4	11.59	12.5	**11.8**	68.18	68.56	69.63	**68.79**
	Zn2	12.7	13.45	13.8	**13.3**	69.77	70.38	70.72	**70.29**
	Zn3	14.7	15.55	15.9	**15.3**	71.53	71.82	72.52	**71.95**
	Mean	**12.9**	**13.51**	**14.4**	**13.6**	**69.83**	**70.25**	**70.96**	**70.35**
Mean	Zn1	11.4	11.91	12.6	**12.6**	68.22	68.7	69.54	**68.83**
	Zn2	13.1	16.65	14.1	**13.6**	70.11	70.71	71.2	**70.7**
	Zn3	15.1	15.62	16.3	**15.1**	71.86	72.29	72.73	**72.29**
	Mean	**13.2**	**13.73**	**14.3**		**70.07**	**70.57**	**71.16**	

L.S.D

V =1.78	**VxZn=2.17**	**V =1.17**	**VxZn=1.48**
Zn =2.04	**VxN=2.00**	**Zn =1.54**	**VxN=1.56**
N = 2.11	**ZnxN=2.18**	**N = 1.44**	**ZnxN=1.85**
VxZn xN=2.19		**VxZn xN= 1.94**	

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تأثير نقع حبوب بعض أصناف القمح طويلة السنبلة الجديدة في الزنك والتسميد الآزوتى بجنوب سيناء".

أحمد عبد المنعم عبد اللطيف.

وحدة المحاصيل – قسم الإنتاج النباتي – شعبة البيئة وزراعات المناطق الجافة – مركز بحوث الصحراء –المطرية –القاهرة.

أقيمت تجربتان حلقيتان بمحطة بحوث رأس سدر بجنوب سيناء التابعة لمركز الصحراء والتي تتصف بارتفاع نسبة كربونات الكالسيوم وكذلك ملوحة مستخلص التربة ومياه الري .ونفذت التجربتان خلال موسمي ٢٠٠٢/٢٠٠٣ &٢٠٠٣/٢٠٠٤ لدراسة تأثير الاختلافات الصنفيه لثلاثة أصناف من القمح) سدس ٧ & سخا ٢٠٢ & سخا ٢٠٤) ونقع الحبوب في محلول كبريتات الزنك قبل الزراعة لمدة ١٢ ساعة) ماء الصنبور & ٠,٠٤% & ٠,٠٦%) والتسميد النتروجين (٨٠ & ١٠٠ &١٢٠كجم ن/فدان (حيث تضمنت التجربة ٢٧ معاملة، وتم تقدير صفات النمو، المحصول ومكوناته وكذلك المحتوى الكيماوي.لكل من الحبوب والقش ونفذ البحث في تصميم القطع منشقة مرتين في أربعة مكررات حيث وزعت الأصناف في القطع الرئيسية ومعاملات النقع بالزنك في القطع الشقية الأولى، ومعاملات التسميد النيتروجين في القطع الشقية الثانية وفيما يلي ملخص لأهم النتائج التي تحصل عليها.

١- أشارات النتائج إلى حدوث اختلافات معنوية بين الأصناف في صفات النمو، المحصول ومكوناته والمكونات الكيماوية بكل من الحبوب والقش .وقد تفوق الصنف سدس٧ على الصفين الآخرين في جميع الصفات .

٢- كذلك أوضحت النتائج إلى حدوث زيادة متدرجة لجميع الصفات بنقع التقاوي في محلول كبريتات الزنك لمدة ١٢ ساعة باستخدام معاملات النقع بالزنك (نقع ماء الصنبور & ٠,٠٤% & ٠,٠٦%) في صورة كبريتات زنك.

٣- وكذلك دلت النتائج أيضا إلى أن التسميد النيتروجيني بمعدل ١٢٠كجم ن/فدان أعطى أعلى القيم مقارنة بالمستويات الأخرى ١٠٠& ٨٠ كجم ن/ف على التوالي.

فيما يخص التفاعلات الثنائية الثلاثية بين عوامل الدراسة فقد أدت هذه التفاعلات إلى حدوث استجابة معنوية للصفات تحت الدارسة وكانت أفضل معاملة تفاعل ثلاثي هي الصنف سدس٧ مع معاملة نقع الحبوب في محلول كبريتات الزنك بتركيز ٠,٠٦%لمدة ١٢ ساعة قبل الزراعة مع التسميد النيتروجيني بمعدل١٢٠ كجم ن للفدان وذلك في ظروف منطقة وادي سدر.