(ISSN) 1110 - 1571

EGYPTIAN JOURNAL OF APPLIED SCIENCE

VOL. 6 NO. (12)

DECEMBER

1991

EDITED AND PUBLISHED BY THE EGYPTIAN SOCIETY OF APPLIED SCIENCE IN COLLABORATION WITH ZAGAZIG UNIVERSITY

Egypt. J. Appl. Sci., 6 (12) 1991 720-733

EFFECT OF SOAKING TABLE BEET SEEDS IN DIFFERENT CONCENTRATIONS OF B, Zn AND Mn AS WELL AS NPK FERTILIZATION LEVEL ON

1- VEGETATIVE GROWTH AND CHEMICAL COMPOSITION OF PLANT FOLIAGE

By

** Orabi, I.O.A.; * Eid, S.M.M. and Abo-Sedera

* *Fac. Agric. Moshtohor, Zagazig Univ., Egypt*

** *Nat. Cent. for Rad. Res. and Tech. Cairo, Egypt*

ABSTRACT

Two field experiments were conducted at the Experimental Farm of the Faculty of Agric. Moshtohor, Zagazig Univ. during the winter seasons of 1989/1990 and 1990/1991 to elucidate the effect of soaking table beet seeds (Beta vulgaris, L.) cv. Early Flat Red Egyptian in different concentrations of Boron, Zinc or Manganese as well as NPK fertilization on vegetative growth and chemical composition of plant foliage.

Obtained results showed that plant vegetative growth expressed as plant length, fresh and dry weight of plant as well as root to top ratio were increased with soaking seeds in different concentrations of B, Zn or Mn as well as increasing NPK-fertilization level. In this regard, the highest values in all forementioned growth parameters were obtained as a result of using B, Zn and Mn at 400, 500 and 1000 ppm, respectively, combined with the highest used fertilization level, i.e., 46.5 Kg N + 49.5 Kg P_2O_5 + 72 Kg K_2O/Fad.

All determined chemical constituents, i.e., total nitrogen phosphorus, potassium, boron, zinc and manganese content of plant foliage were steadly increased either with increasing the concentration of studied micro-nutrients or NPK-fertilization level. The highest concentration of each of studied micro-nutrients combined with the highest NPK fertilization level reflected the maximum increment, of determined macro- and micro-elements.

INTRODUCTION

Nowadays the application of micro- and macro-nutrients proved to be the major determinant of vegetable crop production. Many investigators reported the stimulating effect of applying micro-nutrients as soaking seeds, immersing transplants

and or foliar spray on vegetative growth, yield and quality of different plants.

Gritsenko et al. (1985) and Sharabash and Tabbakh (1985) on sugar beet, Abed et al. (1988a) and Eid et al. (1991) on garlic, Abo-Sedera et al. (1989) on cabbage, El-Kafoury et al. (1991) on onion and Orabi et al. (1991) on carrot reported that using copper, zinc or manganese at different concentrations increased the vegetative growth of the plants expressed as plant height, fresh and dry weight of plant and number of leaves per plant. In addition, Abed et al. (1988b) on pea and (1988a) on garlic, Shafshak and Farag (1987) on spinach and Eid et al. (1991) on garlic indicated that, using micro-nutrients, i.e., Zn, Cu and B at different concentrations either as seeds and cloves soaking in case of pea and garlic or as foliar spray as in spinach and garlic plants increased the macro- and micro-elements content of plant foliage for such crops.

Positive results on vegetative growth and chemical composition of plant foliage due to nitrogen, phosphorus and potassium fertilizers application were obtained by some investigators, Abed et al. (1988a) and Abo-Sedera et al. (1991) on garlic, Abo-Sedera and Shafshak (1990) on beet and Orabi et al. (1991) on carrots.

Therefore, this study was conducted to investigate the effect of seed soaking in boron, zinc or manganese at different concentrations combined with N, P and K fertilizers as soil addition on growth, and chemical compositions of table beet plants.

MATERIALS AND METHODS

This experiment was conducted at the Experimental Farm of the Faculty of Agriculture, Moshtohor, Zagazig University during the winter seasons of 1989/1990 and 1990/1991 to study the effect of soaking seeds in different concentrations of micro-nutrients (Boron, Zinc or Manganese) and soil fertilization with NPK fertilizers as well as their interaction on vegetative growth and chemical composition of garden beet (Beta vulgaris, L.) cv. Early Flat Red Egyptian. The soil of the experimental farm was clay loam in texture with pH 7.7, 1.5% organic matter, 0.103% available N, 2.74 ppm soluble P and 0.5 meq/L.K. The used concentrations of forementioned micro-nutrients were as follows :

1. Distilled water to act as control.
2. 100, 200 and 400 ppm boron as borax salt.
3. 250, 500 and 1000 ppm zinc as sulphate salt.
4. 250, 500 and 1000 ppm manganese as sulphate salt.

The used levels of nitrogen, phosphorus and potassium fertilizer were as follows :

1. 15.5 Kg N + 16.5 Kg P_2O_5 + 24 Kg K_2O/Faddan (level,1).
2. 31 Kg N + 33 Kg P_2O_5 + 48 Kg K_2O/Faddan (level, 2).
3. 46.5 Kg N + 49.5 Kg P_2O_5 + 72 Kg K_2O/Faddan (level,3).

Seeds were soaked for 24 hours in different concentrations of aqueous solutions of studied micro-nutrients and the distilled water used as control. Seeds were sown in hills 10 cm apart at both sides of ridges on October 28th and November 2nd during 1989 and 1990 seasons respectively. Split plot design with four replicates was adopted. The fertilization treatments were arranged in the main plots while, the micro-nutrients treatments were distributed randomly in the sub-plots. The sub-plot area was about 10.5 m^2 (1/400 of Fad.) each experimental plot included five ridges 3m long and 70 cm wide. Four ridges were planted and one was left as a border to prevent the discharge of fertilizers from any plot to adjacent one.

Calcium nitrate (15.5% N), Calcium superphosphate (16.5% P_2O_5) and potassium sulphate (48% K_2O) fertilizers were used as sources of nitrogen, phosphorus and potassium respectively. The amounts of fertilizers were divided into two equal portions. The first one was added after thinning the plants, i.e., 21 days from seed sowing and the second one was added three weeks later.Other agricultural practices were carried out as commonly followed in the district.

Vegetative growth measurements

Ten plants as a representative sample from each experimental plot were taken for measuring the vegetative growth parameters, i.e., plant length, fresh and dry weight per plant. Meanwhile, root/top ratio was calculated by weight.

Chemical constituents were assayed in the oven dry matter as follows :

a- Total nitrogen, phosphorus and potassium were determined according to the methods described by Pregl (1945), Murphy and Riely (1962) as modified by John (1970) and Brown and Lilleland (1946) for nitrogen, phosphorus and potassium respectively.

b- Boron, zinc and manganese were assayed following the method described by Chapman and Pratt (1961).

All obtained data were subjected to statistical analysis according to Gomez and Gomez (1983).

RESULTS AND DISCUSSION

1. Vegetative growth

Data presented in Table (1A) show the effect of soaking seeds pre-planting in different concentrations of boron,

zinc or manganese as well as NPK fertilizers level on vegetative growth parameters of table beet plants. Such data revealed that vegetative growth parameters expressed as plant length, fresh and dry weight per plant as well as root to top ratio were significantly increased as a result of soaking seeds pre-planting in different concentrations of studied micro-nutrients compared to the control treatments. In this regard, boron, zinc or manganese at 400, 500 or 1000 ppm respectively, reflected the highest values in all studied growth aspects. Obtained results may be attributed to the role of micro-nutrients in increasing enzymes activity that control the metabolic processes of plant physiology and consequently the promotion in plant growth. Similar results were reported by Gritsenko et al. (1985) and Sharabash and El-Tabbakh (1985) on sugar beet, Abed et al. (1988a) and Eid et al. (1991) on garlic.

Concerning the effect of NPK fertilization, the same data in Table (1A) indicate that all the studied morphological parameters, i.e., plant length, fresh and dry weight per plant, as well as root to top ratio, increased steadly with increasing fertilization level up to the highest used one (46.5 Kg N + 44.5 Kg P_2O_5 + 72Kg K_2O/Fad.). Obtained results may due to the main role of macro-nutrients (N, P and K) in increasing the meristematic activity of plant tissues and consequently the plant growth. In addition, they representing the major elements required for plant growth due to their role in formation and trans location of plant metabolic substances. These results are in agreement with those obtained by Abed et al. (1988a) and Abo-Sedera et al. (1991) on garlic and Abo-Sedera and Shafshak (1990) on table beet and Orabi et al. (1991) on carrot.

Regarding the effect of the interaction, data indicated in Table (1B) revealed that plant length, fresh and dry weight per plant as well as root to top ratio were significantly increased with increasing the concentration of micro-nutrients and increasing the fertilization level. In this respect, the highest used fertilization level, 46.5Kg N + 49.5 Kg P_2O_5 + 72 Kg K_2O/Fad., combined with soaking seeds pre planting in 400 ppm B, 500 ppm Zn or 1000 ppm Mn reflected the maximum increments in plant growth. Similar results were reported by Orabi et al. (1991) on carrot.

2. Chemical composition of plant foliage

a- Macro-elements content of plant foliage

Data illustrated in Table (2A) show clearly that total nitrogen, phosphorus and potassium content of plant foliage were statistically increased as a result of seeds soaking pre-sowing in different concentrations of B, Zn or Mn compared to the control treatment. In this connection the

maximum values of N, P and K content were obtained in case of soaking seeds in the highest concentration of B, Zn or Mn, i.e., 400, 1000 and 1000 ppm respectively. Obtained results show that there is positive effect for studied micro-nutrients on the uptake of nitrogen, phosphorus and potassium by plant expressed as higher content of N, P and K compared to the control treatment. Abed et al. (1988b) on pea, Shafshak and Farag (1987) on spinach, Eid et al. (1991) on garlic reported that micro-nutrient application eigher as seeds soaking in case of pea or foliar spray in case of spinach and garlic increased total nitrogen, phosphorus and potassium contents of plant foliage.

With regard to the effect of fertilization, it is obvious from the same data in Table (2A) that nitrogen, phosphorus and potassium content of plant foliage were significantly increased during both seasons of growth with increasing fertilization level up to the highest used one (46.5 Kg N + 49 Kg P_2O_5 + 72 Kg K_2O/Fad.). Such results are expected due to increasing of these macro-elements in growth media and consequently the uptake and accumulation by plant increased. Obtained results are in agreement with those reported by Abo-Sedera and Shafshak (1990) on table beet, El-Kafoury et al. (1991) on onion and Orabi et al. (1991) on carrot.

Concerning the interactional effect, it is clear from data in Table (2B) that either increasing the concentration of micro-nutrients or the level of fertilization resulted in increasing the total nitrogen, phosphorus and potassium content of plant foliage. In this respect, the maximum values in the assayed macro-elements were connected with the highest level of fertilization. Obtained results are in confirmity with those obtained by Orabi et al. (1991) on carrot and Abo-Sedera and Shafshak (1990) on garden beet.

b- Micro-elements content of plant foliage

It is obvious from data in Table (3A) that, boron, zinc and manganese content of plant foliage were significantly increased as a result of soaking seeds in different concentrations of studied micro-nutrients and also with increasing the concentration of them compared with the control. In this regard the highest content of B, Zn and Mn was obtained in case of soaking seeds in the highest concentration of each of them respectively. Obtained results agree with those found by Abed et al. (1988a) and Eid et al. (1991) on garlic, Abo-Sedera et al. (1989) on cabbage and Shafshak and Farag (1987) on spinach.

As for the effect of fertilization, the same data in Table (3A) proved that increasing fertilization level up to

Table (1A): Effect of soaking seeds in B, Zn or Mn and NPK fertilization level on vegetative characters of table beet.

Season			1989/1990				1990/1991			
N P K levels kg/fad.	Micro-nutrients	Conc. ppm	Plant length (cm)	Fresh weight/ plant (g)	Dry weight/ plant (g)	Root/ top ratio	Plant length (cm)	Fresh weight/ plant (g)	Dry weight/ plant (g)	Root/ top ratio
	Control		34.7	160.1	17.1	1.27	34.4	156.7	17.3	1.33
	B	100	38.8	199.9	22.6	1.34	39.1	206.9	23.2	1.37
		200	41.7	218.3	24.9	1.39	41.4	225.1	25.2	1.43
		400	47.0	241.7	27.2	1.44	45.8	250.0	27.5	1.43
	Zn	250	39.8	206.7	23.5	1.46	38.9	200.2	22.2	1.42
		500	45.3	241.6	28.2	1.66	46.1	238.4	27.3	1.60
		1000	39.2	220.1	25.0	1.40	43.1	215.2	24.1	1.38
	Mn	250	39.3	210.1	23.2	1.34	41.2	211.7	22.9	1.33
		500	43.1	231.7	26.3	1.37	44.1	239.9	26.4	1.37
		1000	46.3	251.6	28.1	1.52	44.0	240.5	28.5	1.53
L.S.D. at 0.05			0.1	2.3	0.1	0.11	0.1	3.7	0.1	0.12
15.5 kg N + 16.5 kg P_2O_5 + 24 kg K_2O/Fa.			36.9	185.5	20.2	1.37	37.7	190.6	20.1	1.37
31.0 kg N + 33.0 kg P_2O_5 + 48 kg K_2O/Fad.			40.6	216.0	24.5	1.42	40.2	210.5	24.4	1.42
46.5 kg N + 49.5 kg P_2O_5 + 72 kg K_2O/Fad.			47.0	253.0	29.1	1.46	46.3	252.1	28.8	1.31
L.S.D. at 0.05			0.1	3.3	0.1	0.04	0.1	3.1	0.1	0.03

Table (1B): Effect of soaking seeds in B, Zn or Mn and NPK fertilization level on vegetative growth characters of table beets.

Season		1989/1990				1990/1991			
N P K levels kg/Fad.	Micro-nutrients Conc. ppm	Plant length (cm)	Fresh weight/ plant (g)	Dry weight/ plant (g)	Root/ top ratio	Plant length (cm)	Fresh weight/ plant (g)	Dry weight/ plant (g)	Root/ top ratio
15.5 kg N + 16.5 kg P_2O_5 + 24 kg K_2O/Fad.	Control	32.2	139.9	15.4	1.26	33.2	130.0	14.3	1.30
	B 100	34.0	165.1	18.3	1.26	35.0	170.4	18.4	1.33
	B 200	36.1	190.0	21.6	1.28	37.1	185.0	21.2	1.39
	B 400	38.9	209.9	22.6	1.42	40.3	215.0	22.5	1.40
	Zn 250	35.0	180.0	18.9	1.57	34.3	175.2	18.4	1.35
	Zn 500	39.3	200.0	23.0	1.61	40.0	210.0	23.3	1.50
	Zn 1000	36.7	185.3	20.5	1.40	36.0	190.1	20.9	1.33
	Mn 250	36.0	175.1	18.3	1.25	38.4	180.0	18.0	1.26
	Mn 500	39.0	195.2	20.6	1.28	40.1	250.2	21.3	1.30
	Mn 1000	42.0	214.8	22.8	1.40	43.0	220.3	22.8	1.50
31 kg N + 33 kg P_2O_5 + 48 kg K_2O/Fad.	Control	34.9	160.1	17.7	1.30	34.0	165.0	18.1	1.35
	B 100	38.3	200.0	22.8	1.35	37.2	205.0	23.5	1.38
	B 200	41.0	215.0	24.9	1.38	40.0	225.2	24.7	1.40
	B 400	45.1	240.1	28.0	1.40	46.1	250.0	28.0	1.40
	Zn 250	39.0	205.0	23.7	1.40	38.3	200.1	22.0	1.40
	Zn 500	43.0	245.0	28.4	1.63	45.0	235.0	26.8	1.60
	Zn 1000	37.0	220.0	24.2	1.38	40.0	210.2	23.1	1.40
	Mn 250	38.8	195.0	21.2	1.39	41.2	205.0	22.1	1.38
	Mn 500	43.2	230.0	26.6	1.41	44.0	204.3	27.3	1.40
	Mn 1000	46.0	250.0	27.5	1.57	37.0	206.0	28.6	1.50
46.5 kg N + 49.5 kg P_2O_5 + 72 kg K_2O/Fad.	Control	37.1	180.5	18.2	1.25	36.0	175.0	19.6	1.35
	B 100	44.0	234.6	26.8	1.40	43.2	245.2	27.6	1.40
	B 200	48.0	250.0	28.2	1.50	47.0	265.0	29.6	1.50
	B 400	57.0	275.0	31.0	1.50	51.0	285.0	31.9	1.50
	Zn 250	45.3	235.3	27.9	1.40	44.1	225.2	26.1	1.50
	Zn 500	53.7	280.0	33.3	1.75	53.2	270.1	31.8	1.70
	Zn 1000	44.0	254.9	30.3	1.42	45.0	245.3	28.4	1.40
	Mn 250	43.0	260.1	30.1	1.39	44.0	250.0	28.5	1.35
	Mn 500	47.0	270.0	31.6	1.41	48.2	265.2	30.7	1.40
	Mn 1000	51.0	290.00	33.9	1.60	52.1	295.1	34.2	1.60
L.S.D. at 0.05		0.1	3.9	0.4	N.S.	0.1	6.5	0.2	N.S.

Table (2A): Effect of soaking seeds in B, Zn or Mn and NPK fertilization level on N, P and K content (mg/100 g D.W.) of plant foliage.

Season		1989/1990			1990/1991		
N P K levels kg/Fad.	Micro-nutrients Conc. ppm	N	P	K	N	P	K
	Control	3513	170	1607	3543	173	1573
	B 100	3723	257	1693	3787	263	1663
	B 200	3817	306	1769	3883	310	1780
	B 400	3987	353	1877	3993	343	1810
	Zn 250	4407	320	1920	4313	280	1940
	Zn 500	5130	287	2040	5090	343	2073
	Zn 1000	5210	423	2113	5290	427	2150
	Mn 250	3610	343	1883	3807	360	1873
	Mn 500	4583	383	2033	4660	407	2060
	Mn 1000	5203	420	2127	5367	447	2167
L.S.D. at 0.05		939	73	57	260	22	111
15.5 kg N + 16.5 kg P_2O_5 + 24 kg K_2O/Fad.		4056	277	1745	4113	269	1741
31.0 kg N + 33.0 kg P_2O_5 + 48 kg K_2O/Fad.		4243	332	1913	4419	343	1922
46.5 kg N + 49.5 kg P_2O_5 + 72 kg K_2O/Fad.		4556	378	2060	4538	394	2070
L.S.D. at 0.05		166	13	5	42	3	32

Table (2B): Effect of soaking seeds in B, Zn or Mn and NPK fertilization level on total nitrogen, phosphorus and potassium content (mg/100 g D.W.) of plant foliage.

Season			1989/1990			1990/1991		
N P K levels kg/Fad.	Micro-nutrients	Conc. ppm	N	P	K	N	P	K
15.5 kg N + 16.5 kg P_2O_5 + 24 kg K_2O/Fad.	Control		3400	130	1500	3390	120	1470
	B	100	3570	200	1560	3560	190	1530
		200	3660	260	1600	3780	250	1620
		400	3780	300	1750	3800	290	1730
	Zn	250	4190	200	1740	4100	210	1720
		500	4870	250	1880	4750	260	1860
		1000	4950	380	1470	4980	340	1940
	Mn	250	3540	280	1700	3490	300	1740
		500	4700	320	1810	4760	350	1820
		1000	4900	350	1940	5100	380	1980
31 kg N + 33 kg P_2O_5 + 48 kg K_2O/Fad.	Control		3500	170	1600	3540	180	1560
	B	100	3740	270	1680	3860	280	1650
		200	3840	310	1780	3900	320	1740
		400	3980	360	1900	4000	350	1880
	Zn	250	4360	280	1950	4240	290	1980
		500	5180	360	2000	5120	370	2080
		1000	5260	410	2100	5390	440	2190
	Mn	250	3350	350	1860	3780	360	1820
		500	3920	390	2100	4960	400	2120
		1000	5300	420	1160	5400	440	2200
46.5 kg N + 49.5 kg P_2O_5 + 72 kg K_2O/Fad.	Control		3640	210	1720	3700	220	1690
	B	100	3860	300	1840	3940	320	1810
		200	3950	350	1920	4050	360	1980
		4000	4200	400	1980	4180	390	1960
	Zn	250	4670	330	2070	4600	340	2120
		500	5340	380	2240	5400	400	2280
		1000	5420	480	2270	5500	500	2320
	Mn	250	3940	400	2090	4150	420	2060
		500	5130	440	2190	4260	470	2240
		1000	5410	490	2280	5600	520	2320
L.S.D. at 0.05			1627	125	99	451	38	193

Table (3A): Effect of soaking seeds in B, Zn or Mn and NPK fertilization level on B, Zn and Mn content (ppm) of plant foliage.

Season		1989/1990			1990/1991		
N P K levels kg/Fad.	Micro-nutrients Conc. ppm	B	Zn	Mn	B	Zn	Mn
	Control	16	64	28	18	62	30
	100	31	81	35	33	80	36
	B 200	38	101	39	40	101	41
	400	42	113	44	44	112	45
	250	20	161	35	19	165	38
	Zn 500	22	174	38	22	174	42
	1000	24	184	44	24	184	47
	250	18	96	60	20	97	63
	Mn 500	21	103	65	23	108	69
	1000	23	113	72	25	117	75
L.S.D. at 0.05		1.4	4	0.1	1.4	12	0.1
15.5 kg N + 16.5 kg P_2O_5 + 24 kg K_2O/Fad.		22	100	42	23	99	43
31.0 kg N + 33.0 kg P_2O_5 + 48 kg K_2O/Fad.		25	124	46	27	124	48
46.5 kg N + 49.5 kg P_2O_5 + 72 kg K_2O/Fad.		29	133	50	31	137	54
L.S.D. at 0.05		0.7	0.5	0.7	1.4	2.0	0.1

Table (3B): Effect of soaking seeds in B, Zn or Mn and NPK fertilization level on B, Zn and Mn content (ppm) of plant foliage.

Season			1989/1990			1990/1991		
N P K levels kg/Fad.	Micro-nutrients	Conc. ppm	B	Zn	Mn	B	Zn	Mn
15.5 kg N + 16.5 kg P_2O_5 + 24 kg K_2O/Fad.	Control		13	53	26	14	52	27
	B	100	28	69	29	29	66	32
		200	33	82	36	34	81	37
		400	38	48	39	39	94	40
	Zn	250	17	139	32	16	138	33
		500	19	157	34	19	152	38
		1000	22	164	44	21	160	42
	Mn	250	14	71	54	15	74	56
		500	17	76	58	19	79	60
		1000	20	90	65	22	92	67
31 kg N + 33 kg P_2O_5 + 48 kg K_2O/Fad.	Control		16	68	20	18	62	30
	B	100	31	84	34	33	80	35
		200	38	105	37	40	108	40
		400	40	119	42	44	117	44
	Zn	250	20	168	34	19	164	38
		500	22	179	38	22	181	41
		1000	24	190	46	23	192	46
	Mn	250	18	97	60	20	94	62
		500	21	110	65	24	117	69
		1000	24	118	73	26	126	76
46.5 kg N + 49.5 kg P_2O_5 + 72 kg K_2O/Fad.	Control		20	70	30	21	73	33
	B	100	35	91	41	38	95	40
		200	43	116	44	46	115	46
		400	47	121	50	50	124	51
	Zn	250	23	176	38	21	192	43
		500	25	185	42	24	189	47
		1000	27	197	41	27	200	52
	Mn	250	22	120	67	24	122	70
		500	24	124	72	26	128	77
		1000	26	131	78	28	134	82
L.S.D. at 0.05			N.S.	7	2	2	21	1

the highest used one, 46.5 Kg N + 49.5 Kg P_2O_5 + 72 Kg K_2O/Fad. led to a significant increase in B, Zn and Mn content of plant foliage during both seasons of growth. Obtained results are similar to those reported by Abed et al. (1988a) and Eid et al. (1991) on garlic and Orabi et al. (1991) on carrot.

Regarding the interactional effect, it is clear from data recorded in Table (3B) that irrespective of boron content, which was not affected, both Zn and Mn content were significantly increased with increasing the concentration of micro-nutrients and the fertilization level. In this regard, the maximum concentration of B, Zn and Mn in plant foliage was obtained due to the highest concentration used of each of them, i.e., 400 ppm B, 1000 ppm Zn and 1000 ppm Mn combined with the highest level of fertilization.

Generally, it could be concluded that under such condition of this experiment soaking seeds pre-sowing in 400ppm B, 500 ppm Zn or 1000 ppm Mn and fertilization with 46.5Kg N + 49.5Kg P_2O_5 + 72Kg K_2O/Fad. may be recommended for good vegetative growth with highest chemical composition.

REFERENCES

Abed, T.A.; Abo-Sedera, F.A. and Eid, S.M.M. (1988b) : Effect of soaking seeds of pea (Pisum sativum, L.) in some micro-nutrient solutions on growth, yield and quality of pea. Annals of Agric. Sci. Moshtohor, 26(4) : 2663-2674.

Abed, T.A.; Abo-Sedera, F.A. and Orabi, I.O.A. (1988a): Effect of soaking cloves in some micro-nutrient solutions and nitrogen fertilizer soil addition on growth, yield and chemical composition of garlic plants. Annals of Agric. Sci. Moshtohor, 26(4) : 2143 - 2161.

Abo-Sedera, F.A.; Eid, S.M.M. and Orabi, I.O.A. (1989) : Effect of nitrogen fertilizer and foliar spray of zinc and iron on growth and yield of cabbage plants as well as the nutritive value of leaves. Annals of Agric. Sci. Moshtohor, 27(2) : 1215-1230.

Abo-Sedera, F.A. and Shafshak, Nadia, S. (1990) : Studies on the effect of different nitrogen sources and levels on the production and chemical composition of table beet. Annals of Agric. Sci. Moshtohor, 28(1) : 319 - 329.

Abo-Sedera, F.A.; Eid, S.M.M. and Orabi, I.O.A. (1991): Plant growth, yield and chemical composition of some garlic cultivars as affected by NPK fertilization. Annals of Agric. Sci. Moshtohor 29 In press.

Brown, J.D. and Lilleland, O. (1946) : Rapid determination of potassium and sodium in plant material and soil extracts by Flame photometry proc. Amer. Soc. Hort. Sci., 48 : 341-346.

Chapman, H.O. and Pratt, P. (1961) : Method of analysis for soil, plant and water. Univ. of Calif, Div. of Agric. Sci., August, 1961.

Eid, S.M.; Shafshak, Nadia, S. and Abo-Sedera, F.A. (1991): Effect of potassium fertilization and foliar spray of certain micro-nutrients combinations on growth, yield and chemical composition of garlic plant. Annals of Agric. Sci. Moshtohor, 29 In press.

El-Kafoury, A.K.; Shafshak, Nadia, S.; Ibrahim, M.Y. and Abo-Sedera, F.A. (1991) : Response of onion (Allium cepa, L.) grown from sets to some fertilizer treatments. Egypt. J. of Appl. Sci. 6(11) : 334 - 343.

Gomez, K.A. and Gomez, A.A. (1983) : Statistical procedures for agricultural research 2nd ed. John Wiley and Sons Pub. pp. 139 - 153.

Gritsenko, V.V.; Shaldsev, B.P.; Zakharaov, L.N. and Pavalov, M.I. (1985) : A method of increasing the quality of sugar beet seeds. Sakharraya Svekla No. 4 : 26-27. [C.F. Field. Crop. Abstr. 40(6), 3812].

John, M.K. (1970) : Colorimeteric determination of phosphorus in soil and plant materials with ascorbic acid. Soil Sci. 109 : 214-220.

Murphy, J. and Riely, J.P. (1962) : A modified single solution method for the determination of phosph in natural water. Annal. Chem. 27 : 31-33.

Orabi, I.O.A.; Abo-Sedera, F.A. and Eid, S.M.M. (1991) : Plant vegetative growth, chemical composition of plant foliage and roots as well as yield and its components as affected by NK-fertilization and foliar spray of zinc and Molybdenum. Annals of Agric. Sci. Moshtohor, 29 In press.

Pregl, E. (1945) : Quantitative organic micro- analysis 4th ed. J. Chundril, London.

Shafshak, Nadia, S. and Farag, S.A. (1987) : Effect of spray with some micro-nutrients on vegetative and seed yields of spinash. Annals of Agric. Sci. Moshtohor 25(3) : 1659-1673.

Sharabash, M.T.M. and El-Tabbakh, A.E. (1985): Effect of soaking sugar beet seeds in different concentrations of Mn, Cu or Zn on germination, growth, yield and sugar content. Proc. Egypt. Bot. Soc. 4, 1985 (Ismailia Conf.) 974-88.

تأثير نقع بذور بنجر المائدة في تركيزات مختلفة من البورون والزنك أو المنجنيز ومستوى التسميد الأزوتي والفوسفاتي والبوتاسي علي :١- النمو الخضرى والتركيب الكيماوى للمجموع الخضرى للنبات.

* إبراهيم عرابى أحمد عرابى * سعيد معوض محمد عبد ** فتحى أبوالنصر أبوسعده.
* كلية الزراعة بمشتهر – جامعة الزقازيق / فرع بنها
** المركز القومى لبحوث وتكنولوجيا الاشعاع – مدينة نصر – القاهرة

الملخص العربى

أقيمت تجربتان حقليتان بمزرعة التجارب بكلية الزراعة بمشتهر – جامعة الزقازيق خلال الموسم الشتوى لعامى ١٩٩٠/٨٩م ، ١٩٩١/٩٠ م لدراسة تأثير نقع بذور البنجر صنف ايرلي فلات رد ايجيبشيان في تركيزات مختلفة من البورون والزنك أو المنجنيز مع التسميد الأزوتي والفوسفاتي والبوتاسي علي النمو الخضري والتركيب الكيماوي للمجموع الخضري للنبات . وقد أظهرت النتائج المتحصل عليها زيادة النمو الخضري معبرا عنه بطول النبات والوزن الغض والجاف للنبات ونسبة الجذور للعرش ذلك عند نقع البذور في كل التركيزات المختلفة من البورون والزنك أو المنجنيز مع زيادة مستوي التسميد.

وفي هذا الخصوص فان أعلا قيم للقياسات الخضرية كان نتيجة نقع البذور في محاليل من البورون والزنك أو المنجنيز عند التركيزات ٤٠٠ ، ٥٠٠ أو ١٠٠٠ جزء في المليون علي التوالي مع أعلا مستوي تسميدي مستخدم وهو ٥ر٤٦ كجم ن + ٥ر٤٩ كجم فو٢ أ ٥ + ٧٢ كجم بو٢ أ/فدان

كما زاد محتوي المجموع الخضرى من كل من النتروجين الكلي والفوسفور والبوتاسيوم وأيضاً البورون والزنك والمنجنيز بزيادة تركيز العناصر الصغرى المستخدمة أو مستوي التسميد.

وقد كان لأعلي تركيز من كل من العناصر الصغرى تحت الدراسة متحداً مع أعلا مستوي تسميد أفضل الأثر في زيادة كل العناصر الصغري والكبري المقدرة