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PRODUCTIVITY IMPROVEMENT OF ONION (*Allium cepa,* L.) USING NATURAL FERTILIZERS OF PHOSPHORUS AND POTASSIUM UNDER SOUTH SINAI, CONDITIONS

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ABSTRACT

Two field experiments were carried out at Ras Suder Experimental Station in South Sinai Governorate during 2006/2007 and 2007/2008 seasons to study the effect of natural fertilizers of phosphorus and potassium and the combination between them (rock phosphate 22% P_2O_5 and feldspar 10% K_2O) at the rates of 0, 30, 45 P_2O_5 units/ fed. and 0, 48, 96 K_2O units/ fed., respectively. Also, NPK mineral fertilizers were used by the recommended dose as 60 N, 30 P_2O_5 and 48 K_2O units/fed. on growth yield and its components as well as chemical compositions of onion. Drip irrigation system and saline water (about 3700 ppm) was used, the soil was saline and highly calcareous (49.5% $CaCO_3$).

The obtained results revealed that growth characters *i.e.,* plant length, number of leaves/ plant, plant fresh weight of leaves and bulb, also, dry matter of bulb and bulb diameter gave significantly the highest values compared with the control treatment (mineral fertilizers) or natural combination fertilizers treatment (48 P_2O_5 rock phosphate plus 96 K_2O feldspar units/ fed.). Also, the total yield, fresh weight of the bulb and bulb diameter were significantly the highest with the same natural treatment compared to other treatments.

TSS, N, K and SO_4 showed the highest content in onion bulbs with the preveous natural treatment or the control treatment, while the lowest and best figures of Na and Cl content were found with natural fertilizers at rates of 45 P_2O_5 plus 48 K_2O units/ fed.

Key words : *Allium cepa, natural fertilizers, phosphorus, potassium, productivity improvement.*

1. INTRODUCTION

Onion is one of the popular vegetables in Egypt. Increasing productivity of onion is an important target by the growers for local and foreign consumption. The reclaimed calcareous and saline soils are considered valuable future expansion. Attention should be taken with respect to natural nutritional status to reduce contamination and produce healthy plants. Taking in consideration the fact that chemical fertilizers are expensive in Egypt.

Phosphorus is an essential nutritional element, which plays a role in regulation of many physiological functions in plant which in turn affect growth and yield. Nikolay Vassilev *et al.* (1996) reported that organic phosphorus is mineralized and immobilized by microbe activities. Phosphorus is a major building block of DNA molecules (Pant and Reddy, 2003). Hinsinger (2001) reported that the two forms of phosphorus in the soil are organic and inorganic. Organic phosphorus is the most stable form in the soil. Shaheen *et al.* (2007) studied the influence of using rock phosphate and calcium super-phosphate at 3 rates for onion. Increasing the rates up to 48 P_2O_5 units /fed. plant growth recorded the highest peaks. Super-phosphate form gained the heaviest tonnage of bulb yield. On the contrary, rock phosphate increased mineral content in the bulbs than super phosphate.

It is known that potassium is one of the most important elements in plant nutrition. Potassium improves drought resistance, the plant needs it in a large quantity to assimilate and improve growth and yield . (Marschner, 1995). The main source of K for plant comes from mineral and organic-K source. K- feldspar is one of the most important K minerals (Straaten, 2002). Many investigators studied the response of onion to the potassium sources and rates. They found that with increasing potassium application rate, vegetative growth and mineral uptake were increased (Rizk, 2001; Ghoname and Shafeek 2004;El-Desuki, *et al.* 2006 and Ali, *et al.* 2007). Also, Abd El- Al *et al.* (2005) showed that increasing of potassium sulphate up to 300 kg./fed. resulted in the highest

plant growth, yield and quantity of onion bulbs.

The aim of this study was to investigate the influence of natural fertilizers of phosphorus in the form of rock phosphate and potassium in the form of feldspar as well as the combination between them on growth, yield and chemical composition of onion under Ras Sudr conditions.

2. MATERIALS AND METHODS

The field experiments were carried out in the Experimental Farm of the Desert Research Center at Ras Sudr, South Sinai Governorate , during the growing seasons of 2006/2007 and 2007/2008 to study the response of onion plants to natural phosphorus and potassium fertilizes on growth, yield and its components, as well as chemical composition of onion (*Allium cepa,* L.) cv. Giza 20. The physical and chemical analysis of the experimental soil, and the analysis of irrigation water are presented in Tables (A, B and C) according to the methods of Chapman and Pratt (1978).

Drip irrigation system was used from a well where salinity was about 3700 ppm. Seeds of onion were sown in the nursery on September 13 and 20 in both seasons, respectively.

Uniform 60-day old transplants were set up in the field 20 cm apart on both sides of irrigation lines. Each line was considered as an experimental plot having an area of 10.5 m^2, (50 cm apart and 21 m length).

Sixteen treatments were investigated, namely the control $_{i,e.}$ recommended dose of NPK; 60 N, 30 P_2O_5 and 48 K_2O units/fed. as ammonium sulphate (20.5% N), calcium super phosphate (15 % P_2O_5) and potassium sulphate (48 % K_2O), three levels of rock phosphate (22% P_2O_5) as natural source, (0, 30 and 45 P_2O_5 units/ fed.), Three levels of feldspar (10% P_2O_5) as natural source of potassium (0, 48 and 96 the K_2O units/ fed.) and the combination between the levels of rock phosphate and feldspar were applied .

Rock phosphate rates and calcium super phosphate were added to the soil one month before transplanting while the quantities of feldspar rates and potassium sulphate were divided into two parts, the first was dressed one month after transplanting and the second was added one month later.

The general agricultural practices were used with onion seedlings in the nursery and in the field.

The experiment was planned in a completely randomized block design (Snedecor, 1966) with 4 replicates.

Vegetative samples of five plants were taken from each experimental plot at 19 weeks from transplanting. Data were recorded on plant height, number of leaves/ plant , plant weight, fresh and dry weight of leaves and bulb, neck and bulb diameter and bulbing ratio (neck diameter/ bulb diameter).

Yield was harvested when 50% of the plant tops bended down at the age of 24 weeks from

Table (A) : Mechanical properties of the experimental soil(2007-2008).

Depth (cm)	$CaCO_3$ %	Coarse sand (1-0.5)	Fine sand (0.25-0.10)	Sotal sand (1-0.1)	Silt (0.05-0.002)	Clay < 0.002)	Class texture
			%				
0-30	56.99	53.68	27.60	8.05	81.28	10.79	Sandy loam
30-60	52.48	23.74	62.34	7.59	86.08	6.33	Sandy loam

Table (B): Chemical properties of the experimental soil.

Depth (cm)	pH	EC dS/m 2	Saturation soluble extract							
			Soluble anions (me/L)				Soluble Cations (me/L)			
			CO^{-2}_3	HCO_3	SO^{-2}_4	Cl^-	Ca^{++}	Mg^{++}	Na^+	K^+
0-30	7.77	4.77	0.00	6.00	10.50	31.20	24.00	11.00	10.52	2.18
30-60	7.40	4.16	0.00	3.00	16.10	22.50	16.83	6.00	17.80	0.097

Table (C): Chemical analysis of irrigation water.

pH	EC dsm^{-1}	Soluble anions (me/L)				Soluble Cations (me/L)			
		CO^{-2}_3	HCO_3	SO^{-2}_4	Cl^-	Ca^{++}	Mg^{++}	Na^+	K^+
8.60	7.03	0.00	2.50	21.23	41.28	4.50	13.43	47.05	0.12

transplanting. Data were recorded on total yield, average fresh and dry weight of bulb, neck and bulb diameter (cm), and bulbing ratio.

The chemical composition of bulbs were determined: total soluble solids (TSS) were measured using hand refractometer (A.O.A.C., 1975), total nitrogen and phosphorus contents were determined according to Jackson (1958) and Frie *et al*. (1964), respectively. While potassium and sodium contents were determined as described by Brown and Lilliland (1946), chloride content was determined by the method mentioned by Richard (1954). Also the method described by Chapman and Pratt (1978) was used for the determination of sulphur.

3 . RESULTS AND DISCUSSION

3.1.Vegetative growth

Data presented in Tables 1 and 2 show the effect of natural fertilizers on plant vegetative growth expressed as plant length, number of leaves/ plant, fresh weight of whole plant, leaves and bulb, dry weight of leaves and bulb, neck and bulb diameter and bulbing ratio in both growing seasons. The results indicated that the highest and significant values of onion plant length, number of leaves/ plant, fresh weight of plant and its leaves were recorded with the control treatment (NPK mineral fertilizers) followed by feldspar treatment at the rate of 96 K_2O units/fed., followed by the combination treatment (rock phosphate at 45 P_2O_5 units/ fed. plus feldspar at 96 K_2O units/fed).

While, fresh weight and dry matter of bulb showed the highest values with the natural fertilizer treatment (96 K_2O plus 45 P_2O_5) followed by the control treatment. On the other hand, the other parameters of growth were not significantly affected by the tested treatments. The results agree with those obtained by Shaheen *et al*. (2007) and Ali *et al.,* (2008). This may be due to the fact that the presence of phosphorus in the soil encourages plant growth, because it is an essential nutrient (Nikolay *et al*, 1996; Hinsinger, 2001). Also, the enhancement of plant growth as a result of application of potassium may be due to its beneficial improvement effect on plant growth and the fundamental role of K, which stimulates absorption and utilization efficiency from soil nutrient solution (Rizk *et al.* 2002; Sharma *et al.* 2003 and Yadav *et al.* 2003). Also, Moreover the addition of rock phosphate and feldspar gave the greatest plant growth because the natural fertilizers are considered as a slow release. This superiority might be attributed to that plant period has a long live period (5- 6 months), needs slow release source of nutrients during vegetative growth period (Abd El- Mouty and El- Greadly, 2008).

3.2. Yield and its components

Data recorded in Table (3) indicate the response of onion yield to natural fertilizers in both seasons.

The highest onion yield was significantly observed with the combination treatment of rock phosphate and feldspar at the highest rate (45 P_2O_5 plus 96 K_2O units/fed) as compared to any other treatment. The same trend was observed with fresh weight and diameter of bulb. On the other hand, the highest dry weight of bulb was significantly found with natural fertilizers (rock phosphate at 45 P_2O_5 and feldspar at 96 K_2O units/fed). While, the best and lowest figures of neck diameter and bulbing ratio were recorded with rock phosphate treatment at 30 and 45 P_2O_5 units/fed. but the differences among all treatments were not significant in the two growing seasons. Many investigators obtained a similar trend of results (Gupta, *et al.* 1999; Ghoname and Shafeek , 2004 ; Abd El-Al *et al.* 2005). These results may be due to that phosphorus and potassium fertilizers increased the productivity of onion plant as a result of enhancement of plant growth (Tables 1 and 2). Also, yield can be affected by all physical processes including nutrient supply (Ghoname and Shafeek, 2004; El-Bassiouny, 2006 ; Ali *et al.* 2007). Also, phosphorus is found in plants as a constituent of nucleic acids , phospholipids, the coenzymes NAD and NADP and most important, as a constituent of ATP and other high energy compounds.

Phosphorus is essential for plant processes as photosynthesis, respiration, nitrogen and carbohydrate metabolism. The reflect of these functions improve yield of plant (Rains, 1976). Also, potassium application increases yield due to the role of potassium on production of enzyme activity and enhancement of translocation of assimilate and protein synthesis (El-Desuki *et al.*, 2006).

3.3. Chemical compositions

Data presented in Table (4) revealed that TSS, total nitrogen and potassium content gave significantly the highest values with the high rate of the combination treatment of natural fertilizers (45 P_2O_5 units plus 96 K_2O units/fed.) and mineral fertilizer treatment (the control). While, the lowest and best values of sodium and chloride contents were significantly observed

Table (1): Effect of natural fertilizers (rock phosphate and feldspar) on onion plant growth (19 weeks after transplanting) during 2006- 2007 seasons.

Characters / Treatments	Pant length (cm)	No. of leaves/ plant	Fresh wt. (g.)			Dry matter %		Diameter (cm)		Bulbing ratio
			Whole plant	Leaves	Bulb	Leaves	Bulb	Bulb	Neck	
Control	71.90	15.00	157.00	79.00	78.00	10.50	10.20	5.50	2.50	0.45
P_1	61.50	8.00	136.00	67.00	69.00	9.50	8.60	4.60	2.00	0.46
P_2	64.80	8.90	133.00	73.00	60.00	10.20	8.90	4.80	2.20	0.46
P_3	67.70	8.90	145.00	71.00	74.00	10.30	9.00	5.30	2.30	0.44
K_1	69.90	7.80	127.00	63.00	64.00	9.80	8.00	4.50	2.20	0.49
K_2	67.10	8.50	146.00	67.00	72.00	10.20	9.90	5.20	2.30	0.45
K_3	71.70	9.70	150.00	78.00	79.00	10.40	10.80	5.80	260	0.43
P_1+ K_1	54.00	7.70	111.00	53.00	58.00	9.30	7.00	3.80	1.90	0.50
P_2+ K_1	56.90	7.90	119.00	59.00	60.00	9.40	7.80	4.20	2.00	0.48
P_3+ K_1	58.80	8.30	128.00	66.00	62.00	10.00	8.20	4.60	2.10	0.46
P_1+ K_2	59.40	8.00	126.00	66.00	60.00	9.50	8.00	4.40	2.00	0.45
P_2+ K_2	6090	8.80	131.00	61.00	70.00	9.70	8.60	4.70	22.20	0.44
P_3+ K_2	62.70	9.00	139.00	64.00	75.00	10.30	9.80	5.00	2.30	0.43
P_1+ K_3	62.20	8.20	135.00	65.00	70.00	10.00	9.00	5.20	2.20	0.44
P_2+ K_3	64.90	9.00	140.00	64.00	76.00	10.30	9.30	5.40	240	0.43
P_3+ K_3	68.80	9.50	150.00	70.00	80.00	10.90	10.30	5.50	2.60	0.41
L.S.D.at 5%	10.11	2.60	13.23	11.55	13.71	N.S	1.39	N.S	N.S	N.S

Control = NPK minerals (60 N + 30 P_2O_5 + 48 K_2O units/fed. respectively, P_1, P_2 and P_3 = 0, 30 and 45 P_2O_5 units/fed. rock phosphate respectively - K_1, K_2 and K_3 = 0, 48 and 96 K_2O units/fed. feldspar.

Table (2): Effect of natural fertilizers (rock phosphate and feldspar) on onion plant growth (19 weeks after transplanting) during 2007- 2008 seasons.

Characters / Treatments	Pant length (cm)	No. of leaves/ plant	Fresh wt. (g.)			Dry matter		Diameter (cm)		Bulbing ratio
			Whole plant	Leaves	Bulb	Leaves	Bulb	Bulb	Neck	
Control	64.80	9.00	143.00	72.00	71.00	9.60	9.90	4.80	2.20	0.42
P_1	56.00	7.40	117.00	54.00	63.00	8.50	8.20	4.00	2.00	0.43
P_2	59.00	8.00	121.00	66.00	55.00	9.00	8.20	4.20	2.20	0.42
P_3	61.50	8.20	132.00	64.00	68.00	9.50	8.30	4.50	2.50	0.41
K_1	56.300	7.40	115.00	56.00	59.00	8.70	7.40	3.60	2.00	0.44
K_2	61.00	8.80	136.00	68.00	66.00	8.90	9.00	4.00	2.10	0.41
K_3	65.00	9.20	140.00	70.00	72.00	9.60	9.80	5.00	2.30	0.40
P_1+ K_1	49.00	6.90	102.00	48.00	54.00	8.10	7.40	3.10	1.80	0.46
P_2+ K_1	51.80	7.30	109.00	54.00	55.00	8.30	7.50	3.50	2.00	0.43
P_3+ K_1	53.30	7.60	114.00	55.00	59.00	9.00	7.80	3.90	2.10	0.41
P_1+ K_2	54.00	7.10	113.00	59.00	54.00	8.50	7.50	3.60	1.90	0.43
P_2+ K_2	55.40	7.50	119.00	56.00	53.00	8.80	7.80	3.90	2.00	0.42
P_3+ K_2	57.00	8.00	126.00	57.00	69.00	9.30	9.00	4.40	2.20	0.40
P_1+ K_3	56.50	7.20	122.00	58.00	64.00	9.10	8.30	4.00	2.00	0.41
P_2+ K_3	59.00	7.80	128.00	59.00	69.00	9.50	8.50	4.20	2.20	0.40
P_3+ K_3	62.50	9.00	136.00	64.00	72.00	9.80	10.07	4.90	2.30	0.39
L.S.D.at 5%	6.0	1.4	16.89	10.60	12.74	N.S.	1.31	N.S.	N.S.	N.S.

Control = NPK minerals (60 N + 30 P_2O_5 + 48 K_2O units/fed. respectively, P_1, P_2 and P_3 = 0, 30 and 45 P_2O_5 units/fed. rock phosphate respectively - K_1, K_2 and K_3 = 0, 48 and 96 K_2O units/fed. feldspar.

Table (3): Effect of natural fertilizers (rock phosphate and feldspar) on onion yield during 2006- 2007 and 2007- 2008 seasons.

Characters / Treatments	Yield (ton/ fed.)	Fresh wt. of bulb (g.)	Dry wt. of bulb (g.)	Diameter (cm)		Bulbing ratio	Yield (ton/ fed.)	Fresh wt. of bulb (g.)	Dry wt. of bulb (g.)	Diameter (cm)		Bulbing ratio
				Bulb	Neck					Bulb	Neck	
	First Season						Second Season					
Control	10.22	159.70	23.00	8.30	2.50	0.34	9.54	149.10	22.00	7.50	2.00	0.27
P_1	8.29	129.60	21.10	6.90	1.65	0.24	7.78	121.50	20.80	6.30	1.15	0.18
P_2	8.6	134.70	28.20	7.20	1.70	0.24	8.52	128.00	26.50	6.50	1.20	0.19
P_3	8.86	138.50	30.30	7.40	2.15	0.29	8.42	131.50	29.80	6.70	1.65	0.24
K_1	7.88	138.10	22.10	6.60	1.85	0.28	7.12	111.20	21.40	6.20	1.35	0.22
K_2	9.01	140.70	26.90	6.80	2.00	0.29	8.51	132.90	25.50	6.80	1.50	0.22
K_3	9.45	147.60	31.37	8.00	2.05	0.26	9.31	145.50	30.40	7.30	1.55	0.21
P_1+ K_1	8.28	123.30	14.20	7.20	1.93	0.28	7.57	118.30	11.60	6.50	1.45	0.24
P_2+ K_1	8.99	140.50	21.70	7.40	2.10	0.27	8.35	130.50	18.60	6.70	1.60	0.23
P_3+ K_1	10.04	156.90	27.43	7.60	2.15	0.27	9.59	149.60	25.90	6.90	1.65	0.22
P_1+ K_2	7.72	120.60	19.10	7.00	1.90	0.27	7.08	110.60	15.60	6.90	1.40	0.23
P_2+ K_2	8.25	128.90	21.90	7.80	2.15	0.28	7.55	117.90	18.00	7.20	1.65	0.22
P_3+ K_2	8.88	137.70	26.90	8.10	2.20	0.27	8.54	133.40	23.40	7.40	1.70	0.22
P_1+ K_3	10.56	165.00	15.47	8.40	2.15	0.28	9.63	150.50	12.30	7.60	1.65	0.24
P_2+ K_3	10.64	165.80	19.30	8.70	2.25	0.27	9.67	151.10	17.00	7.90	1.75	0.23
P_3+ K_3	11.47	179.20	23.00	9.10	2.35	0.26	10.57	165.20	21.00	8.30	1.85	0.22
L.S.D. at 5%	0.44	14.00	5.08	1.43	N.S	N.S.	0.42	14.55	3.73	N.S.	N.S.	N.S.

Control = NPK minerals (60 N + 30 P_2O_5 + 48 K_2O units/fed. respectively, P_1, P_2 and P_3 = 0, 30 and 45 P_2O_5 units/fed. rock phosphate respectively - K_1, K_2 and K_3 = 0, 48 and 96 K_2O units/fed. feldspar.

Table (4): Effect of natural fertilizers (rock phosphate and feldspar) on constituents of onion chemical composition (24 weeks after transplanting) during 2006- 2007 and 2007- 2008 seasons.

Constituents%	First season							Second season						
Treatments	**T.S.S.**	**N**	**P**	**K**	**Na**	**Cl**	**SO_4**	**T.S.S.**	**N**	**P**	**K**	**Na**	**Cl**	**SO_4**
Control	15.00	2.85	0.65	2.10	0.97	0.89	1.76	13.50	2.54	0.49	2.00	0.55	0.85	1.34
P_1	13.50	2.33	0.58	1.98	0.58	0.89	1.38	12.20	2.15	0.36	1.73	0.56	0.86	1.15
P_2	14.20	2.40	0.60	1.99	0.52	0.80	1.06	12.80	2.25	0.42	1.75	0.51	0.79	1.20
P_3	14.80	2.71	0.62	2.03	0.55	0.85	1.51	13.07	2.44	0.45	1.83	0.54	0.83	1.28
K_1	13.30	2.15	0.57	1.97	0.62	0.96	1.37	12.10	1.93	0.47	1.70	0.55	0.89	1.11
K_2	14.00	2.78	0.62	2.11	0.57	0.88	1.40	12.60	2.23	0.48	1.90	0.56	0.86	1.18
K_3	14.60	2.84	0.64	2.16	0.45	0.69	1.69	13.20	2.40	0.49	2.01	0.46	0.70	1.25
P_1+ K_1	12.20	1.80	0.54	1.93	0.50	0.77	1.16	11.10	1.78	0.34	1.70	0.49	0.76	1.01
P_2+ K_1	12.50	2.00	0.55	1.98	0.51	0.79	1.19	11.40	2.25	0.38	1.78	0.51	0.79	1.08
P_3+ K_1	13.00	2.10	0.56	1.98	0.45	0.69	1.26	11.80	2.43	0.43	1.80	0.46	0.70	1.12
P_1+ K_2	12.40	2.25	0.56	2.01	0.46	0.69	1.34	11.30	2.02	0.35	1.84	0.44	0.75	1.15
P_2+ K_2	13.60	2.30	0.60	2.03	0.42	0.65	1.46	11.90	2.16	0.39	1.86	0.43	0.66	1.19
P_3+ K_2	14.00	2.66	0.61	2.09	0.37	0.57	1.50	12.50	2.18	0.44	1.90	0.38	0.58	1.23
P_1+ K_3	13.70	2.45	0.60	2.04	0.46	0.70	1.44	12.30	2.20	0.37	1.87	0.5	0.6	1.16
P_2+ K_3	14.80	2.48	0.65	2.08	0.42	0.65	1.61	13.40	2.31	0.40	2.00	0.43	0.66	1.22
P_3+ K_3	15.30	2.83	0.70	2.16	0.42	0.69	1.70	13.90	2.42	0.48	2.02	0.40	0.68	1.30
L.S.D. at 5%	1.12	0.27	N.S.	0.14	0.10	0.09	0.28	1.16	0.24	N.S.	0.12	0.10	0.09	N.S.

Control = NPK minerals (60 N + 30 P_2O_5 + 48 K_2O units/fed. respectively, P_1, P_2 and P_3 = 0, 30 and 45 P_2O_5 units/fed. rock phosphate respectively - K_1, K_2 and K_3 = 0, 48 and 96 K_2O units/fed. feldspar.

with the combination treatment of rock phosphate at 45 P_2O_5 plus feldspar at 48 units K_2O. These results were true in both growing seasons. But sulphur content in onion bulb increased with mineral fertilizer treatment and the combination treatment of natural fertilizer (45 P_2O_5 units plus 96 K_2O units/fed.). However, the differences were not significant in the second season.

The results agree with those obtained by Almadini *et al.,* (2000), Alkaff *et al.,* (2002), Sharma *et al.,* (2003) and El-Desuki *et al.,*(2006). These results might be attributed to the increasing level of phosphorus in rooting zone which caused an increase in its absorption by plants, consequently increased the ability of plant roots to uptake more elements in plant tissues. Also, increasing K application in the soil may increase its absorption (Ali *et al*, 2001; Singh and Verma, 2001).

Conclusion

The addition of natural fertilizers (rock phosphate and feldspar) at the rates of 45 P_2O_5 and 96 K_2O units/fed improved growth, yield and chemical composition of plant as mineral fertilizers. The natural fertilizers reduce contamination which is caused by chemical fertilizers and produce healthy and safe plants, as well as the fact that natural fertilizers have less cost than chemical fertilizers.

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تحسين إنتاجية البصل باستخدام التسميد الطبيعى بالفوسفور والبوتاسيوم تحت ظروف جنوب سيناء

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ملخص

أقيمت تجربتان حقليتان بمحطة بحوث رأس سدر بمحافظة جنوب سيناء خلال موسمى 2007/2006 ، 2008/2007 لدراسة تأثير التسميد الطبيعى بالفوسفور والبوتاسيوم والتفاعل بينهما فى صورة صخر الفوسفات (22 % فو$_2$أ$_5$) ، الفلسبار (10 % بو$_2$أ) بمعدلات صفر ، 30 ، 45 فو$_2$أ$_5$ وحدة/الفدان ، صفر ، 48 ، 96 بو$_2$أ وحدة / الفدان على التوالى) وأيضاً تم استخدام التسميد المعدنى (ن، فو$_2$أ$_5$، بو$_2$أ) بالمعدلات الموصى بها (60 ، 30 ، 48 وحدة على التوالى) كمعاملة مقارنة على النمو والإنتاج ومكوناته والتركيب الكيماوى للبصل. استخدم نظام الرى بالتنقيط بمياه ملوحتها فى حدود 3700 جزء فى المليون والتربة ملحية كلية بنسبة 49.5 % ك أ$_3$.

أوضحت النتائج :

أ- بالنسبة لصفات النمو (طول النبات – عدد الأوراق /النبات – وزن النبات – الوزن الطازج والجاف للأوراق والبصلة وقطر البصلة) قد زادت معنوياً مقارنة بالكنترول، ومعاملة استخدام صخر الفوسفات بمعدل 45 وحدة فو $_2$أ$_5$ مع الفلسبار بمعدل 96 وحدة بو$_2$أ للفدان.

ب- بالنسبة للإنتاج فقد تفوق معنوياً وأعطى أعلى قيمة عن باقى المعاملات باستخدام المعاملة السابقة بالتسميد الطبيعى من صخر الفوسفات (45 وحدة فو$_2$أ$_5$ للفدان) والفلسبار (96 وحدة بو$_2$أ للفدان).

جـ- بالنسبة للتركيب الكيماوى (المواد الصلبة الذائبة، النتروجين الكلى، البوتاسيوم، الكبريت)، أعطى أعلى محتوى معنوياً فى الإبصال بالمعاملة 45 وحدة فو$_2$أ$_5$ من صخر الفوسفات مع 96 وحدة بو$_2$أ من الفلسبار / الفدان ومعاملة المقارنة، بينما كانت أقل قيمة لمحتوى الصوديوم والكلوريد وهى أفضل قراءات حققتها المعاملة 45 وحدة فو$_2$أ$_5$ من صخر الفوسفات مع 48 وحدة بو$_2$أ من الفلسبار / الفدان).

لذلك ينصح باستخدام صخر الفوسفات بمعدل 45 وحدة فو $_2$أ$_5$ للفدان، الفلسبار بمعدل 96 وحدة بو $_2$أ للفدان بدلاً من استخدام التسميد الكيماوى (سوبر فوسفات الكالسيوم، سلفات البوتاسيوم). حيث أن التسميد الطبيعى حقق نفس النتائج فى صفات النمو والتركيب الكيماوى وتفوق عليه فى الإنتاج لمحصول البصل. كما أن التسميد الطبيعى يقلل من التلوث ويساهم فى إنتاج محصول صحى وآمن غذائياً، كما ان هذه الصخور الطبيعية منخفضة فى تكلفتها عن الأسمدة الكيماوية التى أصبحت باهظة الأسعار.

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