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Onion Plant Growth, Bulbs Yield and its Physical and Chemical Properties as Affected by Organic and Natural Fertilization

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Abstract: Two field experiments were carried out during the two successive seasons of 2001/2002 and 2002/2003 to investigate the influence of onion plant productivity on non-chemical fertilization, i.e. organic nitrogen at rates of 2 and 4 tons per fed. as town refuse manure and natural P and K at 4 rates (50: 50; 50: 100; 100: 50 and 100: 100 unit/fed. respectively for P and K). Phosphate rock and natural potassium are used respectively for P and K fertilization. The important obtained results are as following: Onion plant growth parameters, i.e. length of plant, average number of leaves/plant, fresh and dry weight of whole plant and its different organs, all of them recorded the more vigor growth with applying 4 ton/fed., of town refuse as organic nitrogen fertilizer. Addition of organic nitrogen fertilizer at higher rate resulted the heaviest tonnage of onion bulbs yield, i.e. 11.96 and 15.429 tons/fed. in 1st and 2nd season respectively as well as the better physical Average bulb weight, length and diameter as well as chemical values i.e. TSS, N, P, K, Cu, Mn, Zn and Fe in bulb tissues. The application of organic nitrogen at two levels and natural P and K caused a great effect on plant growth, total bulbs yield and its physical and chemical properties. By other means the best vigor growth and the heaviest bulbs yield as well as the best values of physical and chemical properties, all of them were obtained with that of onion plant which received the higher organic nitrogen rate (4 tons/fed.) and the highest natural P and K levels (100: 100 of each per fed.).

Key words:

INTRODUCTION

Nitrogen is an indispensable elementary constituent of numerous organic compounds of general importance (amino acids, protein and nucleic acids) and its formation of protoplasm and new cells, as well as, its encouragement for elongation. Also, phosphorus and potassium are major essential elements required for physiological mechanisms of plant growth. The conventional N, P and K fertilizer (chemical) is rapidly lost by either evaporation or by leaching in drainage water. The problem does not only stop at losing big amounts of chemical fertilizers, but it extends to other dangerous environmental pollution. The need for supply vegetable crops with organic and/or natural fertilizers was proved to be very essential for the production of higher yield and for improving its quality. Slow release forms of N, P and K elements include organic nitrogen (such as town refuse manure) and P (such as rock phosphate) as well as potassium (natural potassium), these materials release over a period time. However, natural materials are broken down by soil microorganism [1-2]. The application of municipal solid waste (MSW manure) on some vegetable plants were great affected plant growth, yield and its quality [2-6].

Phosphorus and potassium application had a positive effect on the productivity of some vegetables[2,7,8,9].

The aim of this study is to investigate the application of non chemical fertilizers, only used (organic nitrogen and natural P and K) on the productivity of onion plant.

MATERIALS AND METHODS

Two field experiments were carried out at the experimental Farm of National Research Centre at Shalakan (Kalubia Governorate).In 2001/2002 and 2002/2003 seasons, to study the effect of non- chemical fertilizer (organic nitrogen as town refuse at 2 and 4 tons/fed. and natural P and K at rates, i.e. 50: 50, 50: 100: 100: 50 and 100: 100 units/fed. for P and K, respectively) on onion plants. Rock phosphate as source of P and elemental natural potassium are used as source of potassium. The physical and chemical properties of soil as well as the organic manures which used are presented in Table (1) for the two experiments and physical and chemical properties of town refuse presented in Table (2).

Onion seedling cv. Giza 20 were sown on 1st and 2nd week of December, 2001 and 2002 respectively, at distance of 20 cm apart within the rows of 15 cm within the plants.

Each experiment included 8 treatments which resulted from the interaction between 2 rates of organic nitrogen and 4 rates of natural P and K. whereas, the

Table 1: Physical and chemical analysis of the experimental soils.

Physical properties	2001/2002	2002/2003
Soil texture	Clay	Clay
Clay (%)	48.00	47.07
Silt (%)	27.50	28.61
Fine send (%)	21.14	20.84
Coarse send (%)	2.92	2.65
Chemical analysis		
Available (K) (mg/100 g soil)	0.58	0.60
Available (P) (mg/100 g soil)	6.31	5.27
Total nitrogen (mg/100 g soil)	137.26	139.93
Cl (meq/L)	1.65	1.47
CO_3 (meq/L)	5.13	4.74
Na_2CO_3 (meq/L)	3.82	3.74
$CaCO_3$ (meq/L)	1.65	1.71
Organic matter (%)	2.52	1.84
SO_4 (ppm)	95.41	85.72
EC (mmhos/cm/25°C)	1.83	2.42
pH	7.8	7.6

Table 2: The physical and chemical properties of town refuse.

Characters	Town refuse
Weight (Kg/ m3)	500-650
Humidity (%)	20-33
Moisture retention (%)	150-200
PH	7.0-8.6
EC	4-6
Organic carbon (%)	12.25
Organic matter (%)	32.45
Total nitrogen	1.0-1.6
C/N ratio	10.12-10.16
Total phosphorus (P_2O_5 %)	0.4-0.6
Total potassium (K_2O %)	0.4-0.6
Fe (gm/Kg)	5-8
Mn (gm/Kg)	0.2-0.4
Cu (gm/Kg)	0.3-0.5
Zn (gm/Kg)	1.0-1.5

organic fertilizers were added during preparing the soil for plantation, phosphorus was added once before planting, but K were divided in two parts added 2 and 3 months after planting.

A split-plot design with three replicates was used where; organic fertilizers were allocated to the main plots, while the different rates of P and K were randomly assigned to the sub-plot. Each sub-plot consisted of four rows, each of 5 meters in length and 3.2 m in width. The plot area was 20 cm^2.

The normal cultural practices used for the onion production were followed according to the traditional cultivation in the experimental location.

Plant growth expressed as plant length (cm), number of leaves per plant, neck and bulb diameter (cm), as well as the whole fresh and dry weight of onion plant and its leaves, neck and bulb as g/plant were recorded in representative samples (5 plants) which were taken randomly from every experimental plot at 110 days after planting in both investigated seasons.

At harvesting time, fresh onion yield was calculated in terms of total bulbs yield as tons / fed. in both two experimental seasons. Some physical properties of onion bulbs were recorded such as average bulb weight as length and diameter of bulb at harvesting time.

The chemical constituents as nutritional values (N, P, K, Fe, Mn, Zn and Cu) in bulbs tissues were estimated, where total nitrogen, phosphorus and potassium were determined according to the methods which described by Pregl [10], Troug and Mayer [11] and Brown and Lilleland [12], respectively. As well as Fe, Mn, Zn and Cu concentration were determined using flame ionization atomic absorption, spectrometer of Chapman and Pratt [13].

The obtained data were subjected to the analysis variance procedure and treatment means were compared to the L.S.D. test according to Gomez and Gomez [14].

RESULTS AND DISCUSSIONS

A. Plant growth:

1. Effect of the Organic Nitrogen: The presented data in Tables (3 and 4 for 1st and 2nd seasons) clearly indicate that all plant growth parameters of onion plant had a positive response with addition town refuse as an organic nitrogen fertilizer. Whereas, statistical analysis of the obtained data revealed that the differences within the two used rates of town refuse were significantly at 5 % levels for all plant growth parameter. These findings were true in both experimental seasons with exception of bulb and neck diameter as well as dry weight of bulb in 1st season. Generally, addition 4 tons/fed. of town refuse resulted the vigor plant growth compared with addition the lower rate (2 tons/fed.). However, the whole fresh and dry weight of onion plant recorded higher values with addition 4 tons/fed. of organic fertilizer, amounted by 42.2 and 28.4 %; and by 40.6 and 45.7 % respectively in 1st and 2nd experiments respectively for whole fresh and dry weight of onion plant in 1st and 2nd experiment.

The application of organic manure to the soil whether alone or in combination with mineral fertilizers has been a successful practice to improve the physical, chemical and biological properties of the soil as well as its productivity [15-17].

2. Effect of Natural P and K Application: Addition different rates of either phosphors as phosphorus rock or potassium as natural potassium resulted an enhancement in plant growth characters of onion plant as shown in Tables (3 and 4). Moreover, the obtained results indicates that, onion plant more responsed to the addition of phosphorus than that of potassium addition, but when increasing the two natural elements, i.e. P and K, the most vigor of onion plant growth were resulted. Generally in the two seasons of experiment,

Table 3: Effect of organic nitrogen and natural P and K on vegetative growth of onion plant during the experiment season of 2001/2002.

			Plant length	No. of leaves	Diameter		Fresh weight (g.)				Dry weight (g.)			
Town refuse	P	K	(cm)	/plant	Bulb	Nick	Leaves	Nick	Bulb	Whole plant	Leaves	Nick	Bulb	Whole plant
2 ton/fed.	50	50	49.00	7.00	4.53	1.40	35.00	21.83	63.03	119.83	3.20	1.60	9.50	14.30
	50	100	49. 67	8.33	5.30	1.57	43.43	25.87	88.37	157.67	3.67	1.97	13.00	18.63
	100	50	54.00	9.00	5.27	1.53	55.73	31.07	117.20	204.00	4.73	2.37	20.80	27.90
	100	100	55. 67	11.33	5.63	1.87	60.00	38.23	125.53	223.77	5.50	2.87	18.90	27.27
	Mean		52.08	8.92	5.18	1.59	48.54	29.25	98.53	176.32	4.28	2.20	15.55	22.03
4 ton/fed.	50	50	48.00	7.67	4.40	1.37	38.37	18.83	62.20	119.40	3.40	1.30	8.90	13.60
	50	100	52.33	9.67	5.50	1.73	56.43	34.80	145.40	236.63	5.13	2.63	19.30	27.07
	100	50	57.67	11.33	5.90	2.00	67.63	41.60	193.47	302.70	6.53	3.70	25.17	35.40
	100	100	60.67	12.00	6.53	1.93	77.23	45.77	220.90	343.90	8.80	4.77	34.23	47.80
	Mean		54.67	10.17	5.58	1.76	59.92	35.25	155.49	250.66	5.97	3.10	21.90	30.97
Average	50	50	48.50	7.33	4.47	1.38	36.68	20.33	62.60	119.62	3.30	1.45	9.20	13.95
	50	100	51.00	9.00	5.40	1.65	49.93	30.33	116.88	197.15	4.40	2.30	16.15	22.85
	100	50	55.83	10.17	5.58	1.77	61.68	36.33	155.33	253.35	5.63	3.03	22.98	31.65
	100	100	58.17	11.67	6.08	1.90	68.62	42.00	173.2	283.83	7.15	3.82	26.57	37.5
L.S.D. at 5%	Twon refuse		1.70	1.11	N.S.	N.S.	4.90	2.61	30.8	30.53	1.16	0.72	N.S.	6.38
	Fertilizers		2.61	0.82	0.53	0.17	5.13	3.47	21.3	21.6	0.88	0.79	5.02	4.95
	Interactions		N.S.	N.S.	N.S.	N.S.	N.S.	4.91	30.1	30.6	1.25	N.S.	N.S.	7.00

Table 4: Effect of organic nitrogen and natural P and K on vegetative growth of onion plant during the experiment season of 2002/2003.

			Plant length	No. of leaves	Diameter		Fresh weight (g.)				Dry weight (g.)			
Town refuse	P	K	(cm)	/plant	Bulb	Nick	Leaves	Nick	Bulb	Whole plant	Leaves	Nick	Bulb	Whole plant
2 ton/fed.	50	50	39.00	6.00	3.67	1. 27	28.95	16.33	42.39	87.66	3.45	1.68	6.45	11.58
	50	100	43.67	7.00	4.13	1.30	31.76	17.15	68.70	117.61	3.88	2.18	8.63	14.69
	100	50	47.33	6.67	4.07	1.50	34.10	17.46	90.94	142.49	4.28	2.30	11.16	17.74
	100	100	48.00	8.00	4.43	1.47	36.04	19.20	102.37	157.61	5.00	2.98	13.8	21.75
	Mean		44.50	6.92	4.08	1.38	32.71	17.53	76.10	126.34	4.15	2.29	10.0	16.44
4 ton/fed.	50	50	43.67	6.67	3.50	1.20	27.95	16.60	48.42	92.98	3.55	1.59	7.00	12.08
	50	100	50.00	8.67	4.43	1.53	37.22	21.00	96.51	154.73	4.46	2.90	12.61	19.97
	100	50	54.33	9.00	4.83	1.60	41.82	22.38	115.97	180.18	5.61	3.60	16.11	25.33
	100	100	55.67	10.67	5.20	1.83	47.57	25.04	148.62	221.24	7.04	6.70	24.70	38.42
	Mean		50.92	8.75	4.49	1.54	38.64	21.26	102.38	162.28	5.16	3.70	15.09	23.95
Average	50	50	41.33	6.33	3.58	1.23	28.45	16.47	45.40	90.32	3.50	1.64	6.70	11.83
	50	100	46.83	7.83	4.28	1.42	34.49	19.07	82.60	136.17	4.17	2.54	10.62	17.33
	100	50	50.83	7.83	4.45	1.55	37.96	19.92	103.46	161.33	4.95	2.95	13.64	21.54
	100	100	51.83	9.33	4.82	1.65	41.80	22.12	125.50	189.43	6.02	4.84	19.23	30.09

Table 4: Continue

L.S.D. at 5%	Town refuse	3.70	0.85	0.23	0.14	0.31	1.57	9.84	8.88	0.23	0.80	0.70	0.25
	Fertilizers	3.80	0.79	0.28	0.10	1.91	1.57	4.83	5.62	0.43	1.45	1.77	1.03
	Interactions	N.S.	N.S.	0.40	0.14	2.70	2.22	6.83	7.95	0.60	N.S.	2.51	1.45

showed that, the poor vigor of plant growth noticed with that plants which supplied P and K at lowest rate, i.e. 50 units for each per fed. On the contrary that plants which received 100 units for each of P and K resulted the best plant growth characters. Whereas, the statistical analysis of the obtained data recorded a significant differences within different P and K rates. These findings were true for all plant growth criteria's in the two experiments.

Plant requirements of potassium quite high. When this element is presented in short supply, characteristics difference symptoms appear in the plant. The first attribute which has bean most frequently measured in relation to potassium requirements is plant growth. There is no doubt that K as an important nutritional element plays its part in equal many physiological criteria in the plant which in turn affect the resulted total yield. The review of literature of current knowledge about K, may reflect the interact of many workers in studying its mode action and its role in the cell plant metabolic.

Regarding to the effect of P-application on plant growth could be explained through the role of phosphorus which is extremely important as a structural part of many components, notably nucleic acid and phospholipids. In addition phosphorus on indispensable role in energy metabolism the high energy of hydrolysis of phosphate and various organic phosphate bonds being used to induce chemical reaction. Many investigators studies the role of P and K in vegetable plant production and their results are in good accordance with that which written here [2,7,8,18].

3. Effect of the Interaction Between Organic N and Natural P and K: The data in Table (3 and 4) shows that, whole fresh weight of plant and its bulb and neck, as well as whole dry weight of onion plant and its leaves and bulb in both experiments of 2001/2002 and 2002/2003, all of these parameters significantly responsed by the interaction treatments. On the contrary, plant length and leaves number as well as dry weight of neck of onion plant in both seasons responsed no significantly by the interaction treatments.

It could be concluded that, in spite of the no significant effect of the interaction treatment, but generally, the presented data indicates that, the most vigor of onion plant growth were noticed with that plants which received the highest organic nitrogen as town refuse (4 tons/fed.) and P + K as natural source (100+100 units/fed). These findings were completely similar in the two seasons. Many investigators reported that application of organic manures to vegetable plants as individual fertilizer and/or mixed with mineral elements such as rock phosphate or natural K has been a successful practice to improve the physical, chemical and biological properties of soil which reflected on plant productivity [19-21].

B. Total Bulbs Yield and its Some Physical Properties:

1. Effect of the Organic Nitrogen: Increasing the rate of town refuse addition as an organic nitrogen fertilizer from 2 up to 4 tons/fed. Caused an increase in tonnage bulbs yield of onion in both experiments. This increments amounted by 17.4 and 17.8 % respectively in 1st and 2nd season. However, it is known that increasing the rates of nitrogen fertilizer in rooting zone raised the availability of minerals in soil solution which favoured the plant growth and hence increased the total bulbs yield. The obtained increments from using the higher rate of town refuse as source of nitrogen fertilizer may be due to the increase in one or more of the estimated attributes either in leaves or bulbs. However, the picture reflected significant increase in leaves number as well as fresh and dry weight of leaves and bulb. So, these increments in our opinion led to the favoured jump in the production of onion in this experiment. Many investigators gained the same trend similar that which written in this script[3,4,56,22,23].

Regarding the average bulbs weight (g. /bulb); bulb dimension (length and diameter) as physical properties and their affecting with the addition of town refuse at rates of 2 and 4 tons/fed., the obtained data are presented in Table (5). The statistical analysis of the obtained results shows that, length bulb (in the two seasons), average bulb weight (1st season) and bulb diameter (2nd season) recorded no significant differences at 5 % level. In spite the no significant effect in some physical parameter, but its clear that with increasing the rate of nitrogen addition, the physical properties of onion bulbs improved, it means that the better properties associated with addition of 4 ton/fed., of town refuse as organic nitrogen.

Generally obtained high bulbs yield and better physical properties of onion bulb may be due to the increase of plant growth parameters (Tables 3 and 4) which in turn increases the photosynthesis processes rate also the assimilation of such product in plant tissues.

Table 5: Effect of organic and natural P and K on total bulbs yield of onion and its some physical properties during the two seasons.

		2001/ 2002				2002 /2003			
		Bulbs							
Town refuse	P K	Yield (ton/fed.)	Average wt.	Length	Diameter	Yield (ton/fed.)	Average wt.	Length	Diameter
2 ton/fed.	50 - 50	6.550	96.67	5.83	5.80	8.445	74.40	6.37	5.53
	50 - 100	7.380	118.44	5.73	6.10	9.680	92.50	6.41	5.87
	100 - 50	8.317	124.94	6.33	5.70	10.797	107.30	6.69	6.00
	100 -100	9.323	143.01	6.17	6.03	13.520	112.82	6.70	6.53
	Mean	7.893	120.76	6.02	5.91	10.611	96.75	6.54	5.98
4 ton/fed.	50 - 50	6.220	88.02	5.83	5.40	8.223	79.93	6.39	5.13
	50 - 100	8.507	135.20	6.87	6.13	11.819	100.02	6.53	6.37
	100 - 50	10.383	166.64	7.47	6.83	14.523	125.94	6.95	6.60
	100 -100	11.960	174.37	7.43	7.13	15.429	138.00	7.07	6.70
	Mean	9.268	141. 06	6.90	6.38	12.498	110.98	6.74	6.20
Average	50 - 50	6.385	92.35	5.83	5.60	8.334	77.17	6.38	5.33
	50 - 100	7.943	126.82	6.30	6.12	10.749	96.26	6.47	6.12
	100 - 50	9.350	145.79	6.90	6.27	12.660	116.62	6.82	6.30
	100 -100	10.642	158.69	6.80	6.58	14.474	125.41	6.88	6.62
L.S.D. at 5%	Town refuse	0.347	N.S.	N.S.	0.32	1.206	5.53	N.S.	N.S.
	Fertilizers	0.804	12.11	0.54	0.40	1.009	10.36	0.25	0.25
	Interactions	1.138	17.13	N.S.	0.57	1.427	N.S.	N.S.	0.35

The obtained results of some physical criteria, s of onion bulb are in good accordance with that which reported by Rizk,[1]; Faten *et al*.[5]; Jayathilake *et al*.,[24]; Shafeek *et al*.,[6] and Mondal *et al*.,[23].

2. Effect of Natural P and K Application: It is obvious from the presented data of Table (5) that, increasing the addition rate of P and K caused an enhancement in Total bulbs yield of onion as tons/fed. It means that the heaviest tonnage was correlated with addition the highest P and K rate, i.e. 100 units for each. However, the enhancement due to applying phosphorus is more than that using potassium. Moreover, raising the two elements together was more favorable for obtaining the best results. By other means increasing K from 50 units/fed., to 100 units resulted an increase amounted by 24.4 and 28.97 % but increased P by the same obvious rate resulted an increase amounted by 46.4 and 51.9 % respectively in 1st and 2nd seasons. The statistical analysis of the collected data reveals that the differences with different treatments were enough to reach the significant level.

The average weight, length and diameter of onion bulb as physical properties, the results of Table (5) clearly indicated that their response were completely similar that of total bulbs yield in both two experiments.

Generally, the advanced effect of P-application in increasing the tonnage bulbs yield and its physical properties could be explain through the role of phosphorus which is extremely important as a structural part of many components, notably nucleic acid and phospholipids. In addition, phosphorus on indispensable role in energy metabolism the high energy of hydrolysis of phosphate and various organic phosphate bonds being used to induce chemical reaction.

On the other hand, the promoting effect of potassium fertilizer on the onion yield may be due to that potassium is the prevatent action in plant and involved in maintenance of ionic balance in cells and it bounds inically to the enzyme pyruvale kinase, which is essential in respiration a carbohydrate metabolic [25]. The yield response to adequate phosphorus and potassium fertilizer could be attributed to response of all tested growth features of onion plant previously

Table 6: Effect of organic nitrogen natural P and K on chemical consistuents of onion bulb tissues during the season of 2001/2002.

				%			ppm			
Town refuse	P K	TSS	Protein	N	P	K	Cu	Mn	Zn	Fe
2 ton/fed.	50 - 50	9.30	8.27	1.32	0.28	1.16	10.36	26.63	33.93	2.68
	50 - 100	10.73	9.52	1.52	0.33	1.30	11.89	26.97	36.50	2.93
	100 - 50	12.70	10.92	1.75	0.37	1.25	11.52	27.83	36.83	3.07
	100 -100	11.73	14.44	2.31	0.45	1.60	13.47	29.83	38.00	3.38
	Mean	11.12	10.79	1.73	0.35	1.33	11.81	27.82	36.32	3.02
4 ton/fed.	50 - 50	9.57	7.88	1.26	0.25	1.14	11.28	25.17	35.37	2.73
	50 - 100	13.30	12.56	2.01	0.35	1.82	12.11	26.07	36.27	3.08
	100 - 50	13.27	13.38	2.14	0.51	1.41	12.84	32.63	37.73	2.87
	100 -100	12.00	14.08	2.25	0.62	2.11	12.43	32.40	39.97	2.86
	Mean	12.03	11.97	1.92	0.43	1.62	12.16	29.07	37.33	2.89
Average	50 - 50	9.43	8.07	1.29	0.27	1.15	10.82	25.90	34.65	2.71
	50 - 100	12.02	11.04	1.77	0.34	1.56	12.00	26.52	36.38	3.00
	100 - 50	12.98	12.15	1.94	0.44	1.33	12.18	30.23	37.28	2.97
	100 -100	11.87	14.26	2.28	0.53	1.86	12.95	31.12	38.98	3.12
L.S.D. at 5%	Town refuse	0.76	N.S.	N.S.	0.05	0.15	N.S.	N.S.	N.S.	N.S.
	Fertilizers	0.97	1.22	0.20	0.06	0.10	0.48	2.75	N.S.	0.23
	Interactions	N.S.	1.73	0.28	0.09	0.15	0.67	N.S.	N.S.	N.S.

discussed, whereas, yield can be affected by all physiological processes increasing growth and nutrient supply.

Obtained results showing the superior effect of phosphorus and potassium fertilizer on onion bulb yield and its physical parameters are in agreement with those reported by Almadini and Hamail, [7]; Fatma *et al*., [2]; Ahmed *et al*., [26] and Yadav *et al*., [18].

3. Effect of the Interaction Between Organic N and Natural P and K: Table (5) shows clearly that the heaviest bulbs yield of onion were obtained with that plants received the higher rate of organic nitrogen (4 ton/fed., of town refuse) and the highest level of P and K, i.e., 100 units of each per fed. These findings are true in both two seasons. The response of average bulb weight (g. /bulb), length and diameter of bulb as a physical properties, responsed similar that of total bulbs yield.

Generally, the statistical analysis of the collecting data showed that the interaction treatments had a significant effect on total bulbs yield (as tons/fed. (two seasons), average bulb weight as g./bulb (2^{nd} season) and bulb diameter (1^{st} season).

C. Chemical constituents:

1. Effect of the Organic Nitrogen: Tables (6 and 7) indicated that the statistical analysis of the obtained data reveals that the application of town refuse as organic nitrogen fertilizer at rate of 4 tons/fed. caused a significant increase in the values of nutritional elements and total soluble solids. These findings were true only for P, K and TSS in the both seasons; and for contents of protein, N, Mn and Zn in 2^{nd} experiment, as well as P in 1^{st} seasons. Generally, in spite of the no significant response of some nutritional values by the addition rate of nitrogen fertilizer, but, the recorded data shows that there are a clear trend to increasing nutritional values of onion bulb tissues with that plants which supplied 4 tons town refuse.

It could be concluded that, increasing the rates of nitrogen fertilizer in solution soil around rooting zone caused an increase in the solubility and availability of nutrients hence increasing the absorption of the nutritional elements in plant tissues. The reports of Abdel-Moez, *et al*., [3] and 2001[4]; Nassar *et al*., [27]; Rizk, [1] and, Faten, *et al*., [5] are in good accordance with that obtained here.

Table 7: Effect of organic nitrogen and natural P and K on chemical consistuents of onion bulb tissues during the seasons of 2002/2003.

				%			ppm			
Town refuse	P K	TSS	Protein	N	P	K	Cu	Mn	Zn	Fe
2 ton/fed.	50 - 50	11.05	8.81	1.41	0.30	1.56	10.93	24.00	24.00	2.50
	50 - 100	11.72	9.83	1.57	0.30	2.10	11.98	25.47	25.47	2.81
	100 - 50	11.85	11.44	1.83	0.31	1.91	11.84	26.00	26.00	2.94
	100 -100	12.44	11.90	1.90	0.32	2.29	12.95	29.77	29.77	3.28
	Mean	11.77	10.49	1.68	0.31	1.97	11.93	26.31	26.31	2.88
4 ton/fed.	50 - 50	10.81	10.08	1.61	0.31	1.81	11.57	27.97	27.97	2.98
	50 - 100	12.17	11.21	1.79	0.31	2.44	12.56	27.47	27.47	2.75
	100 - 50	13.03	11.92	1.91	0.32	1.97	12.71	31.87	31.87	2.73
	100 -100	13.66	13.83	2.21	0.35	2.80	12.58	35.27	35.27	3.31
	Mean	12.42	11.76	1.88	0.32	2.26	12.35	30.64	30.64	2.94
Average	50 - 50	10.93	9.45	1.51	0.20	1.69	11.25	25.98	25.98	2.74
	50 - 100	11.94	10.52	1.68	0.21	2.27	12.27	26.47	26.47	2.78
	100 - 50	12.44	11.68	1.87	0.22	1.94	12.27	28.93	28.93	2.84
	100 -100	13.05	12.86	2.06	0.23	2.55	12.77	32.52	32.52	3.30
L.S.D. at 5%	Town refuse	0.20	0.92	0.15	N.S.	0.08	N.S.	0.25	0.25	N.S.
	Fertilizers	0.36	0.88	0.14	N.S.	0.14	0.76	2.21	2.21	N.S.
	Interactions	0.51	N.S.	N.S.	0.01	N.S.	N.S.	N.S.	N.S.	N.S.

2. Effect of Natural P and K: With increasing the rate of P and K addition, the values of TSS, protein, N, P, K, Cu, Mn, Zn and Fe recorded an enhancement as shown in Tables (6 and 7). It means that, the lowest nutritional values of the above mentioned parameters were associated with addition of P and K at rate of 50 units/fed., for each. On the contrary, the highest values were recorded with that onion plants which received the highest P and K level, i.e. 100 units/fed. for each.

However, the obtained data reveals that, the addition of phosphorus gained better chemical constituents in onion bulb tissues compared with potassium addition. Moreover, increasing both P and K addition up to 100 units of each per fed., had the best chemical constituents. The statistical analysis of the resulted data shows that the increasing addition of P and K had significant differences on values of TSS, protein, N, K, Cu and Mn in seasons and P, Zn and Fe only in one experiment.

Generally, increasing the applying levels of natural P and K for onion plant caused an improvement in the nutritional values of onion bulb tissues. Many investigators such as Fatma *et al*., [2]; Zadraokovic *et al*., [9] and Ahmed *et al*., [26] reported that, the elemental values in vegetable fruit tissues raised with increasing the nutrient fertilization in rooting zone area.

3. Effect of the Interaction Between Organic Nitrogen and Natural P and K: The data of Tables (6 and 7) reveals that, the interaction treatments of organic nitrogen rates, i.e., 2 and 4 tons of town reuse per fed., with the addition natural P and K at rates, of 50: 50, 50: 100, 100: 50 and 100: 100 units/fed., respectively had a slow effect on the nutritional values of onion bulb tissues. Whereas, only P content in experiments and N, K and Cu only in one experiment which recorded a significant response by the interaction treatments.

It could be concluded that, the no significant results which obtained might be explained by that of each factor of the interaction treatments act individually, i.e. independently.

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