J. Plant Production, Mansoura Univ., Vol. 3 (12): 3037 - 3049, 2012

PRODUCTIVITY IMPROVEMENT OF ONION (*Allium cepa* L.) UNDER SIWA OASIS CONDITIONS

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ABSTRACT

Two field experiments were conducted during the two successive winter seasons of 2004/2005 and 2005/2006 at Siwa Oasis, Khamisa region, Egypt. The aim of the study was to investigate the effect of organic manures and bio-fertilizers on onion (*Allium cepa* L.) cv. Giza 20 grown on sandy soil irrigated with saline water (about 7000 ppm). Three sources of organic manure (farmyard, sheep and poultry manure) were added to the soil before transplanting at rate of 30, 20 and 10 m^3 /fed. respectively. Bio-fertilizers (Nitrobeine, Phosphorene and Nitrobeine + Phosphorene) were used at rate of 3 kg/fed. for each one by dipping onion seedlings in bacterial suspension before transplanting. Growth characters, yield and its components as well as chemical content of onion bulb were recorded. As for the effect of organic manures on vegetative growth of onion plant expressed as plant height, number of leaves per plant and fresh and dry weight per plant, results showed that the best values were obtained with application of poultry manure when compared with other organic manure applications. Moreover, yield and its components (bulb and neck diameter, bulb fresh and dry weight and total yield as well as chemical content of onion bulb (T.S.S., Carbohydrate, nitrogen, phosphorus and potassium) gave the same previous trend. As regard to the effect of bio-fertilizers, the mixture of Nitrobeine combined with Phosphorene gave the highest values of all parameters, except neck diameter, followed by adding Nitrobeine as compared with using Phosphorene. As for the effect of the interaction between organic manures and bio-fertilizers, results indicated that application of poultry manure combined with the mixture of Nitrobeine and Phosphorene gave the best vegetative growth, bulbs yield and chemical bulb content.

Keywords: Onion, *Allium cepa,* farmyard manure, FYM, poultry manure and sheep manure, bio-fertilizers, Nitrobeine, Phosphorene, growth, yield and chemical content.

INTRODUCTION

Onion (*Allium cepa* L.) is one of the most export vegetable crops. In addition, it is one of the crops that could be cultivated in the reclaimed lands. Fleshy leaves are food organs and bulb is eaten fresh or cooked with vegetables for its flavor**.** Onions have wider use in manufacture of soaps, ketchups and onion flakes (dehydrated) for food seasoning. Further more, it is used for its beneficial medical effects.

Organic agriculture could conserve environment and avoid contamination of the farm produced from the use of chemical fertilizers and pesticides which reflected on unsafe for human consumption. Organic sources of plant nutrients are considered as an important factor for onion production (Funda *et al.,* 2011). The organic manures contain nutrients in small quantities as compared to the chemical fertilizers, also it contain growth promoting substances like enzymes and hormones, besides improvement of soil fertility and productivity (Bhuma, 2001). Organic materials such as poultry

manure, green manures and farmyard manure (FYM) can substitute for inorganic fertilizers to maintain productivity and environmental quality (Choudhary *et al.,* 2002).

Varu *et al.* (1997) reported that the highest bulb yield as well as bulb diameter, weight and volume obtained with application of FYM + NPK treatment. Chandramohan (2002) added that farmyard manure improves the physical properties of soil such as aggregation, aeration, permeability and water holding capacity. Sharma *et al.* (2003) reported that application of FYM increased bulb yield of onion as compared with mineral fertilization alone.

Somners and Sutton (1980) showed that the total N and P contents of poultry manures and litters are among the highest of all animal manures. Castellanos and Pratt (1981) reported that 60 per cent of the organic N in poultry manure was available due to its rapid mineralization and it was recognized as a valuable source of plant nutrients for crops. Pimpini *et al.* (1992) studied the effect of poultry manure and mineral fertilizer combinations (140 kg N + 140 kg P_2O_5 + 100 kg K_2O/ha and 210 kg N + 210 kg P_2O_5 + 150 kg K_2O/ha) as compared with a non-fertilized (control). All the fertilizer treatments increased plant height and size of onion bulbs. This was confirmed later by Abbey (2000) who reported that application of 3 t per ha poultry manure plus 100 kg NPK, gave the highest onion bulb yield.

Sheep manure is one of the most important sources of organic fertilization in desert area. Abd-Elrazzag (2002) studied the effect of chicken manure, sheep manure and inorganic fertilizer on yield and nutrients uptake by onion plants. Data showed that the plant growth and yield increased significantly with sheep manure and inorganic fertilizer. Also, with increasing the rate of the sheep and chicken manure, N content of onion increased significantly, while P and K contents had low level.

As for biofertilizers, Thilakavathy and Ramaswamy (1998) recorded the highest bulb yield was obtained with application of 45 kg N + 45 kg P + 30 kg K per ha plus *Azospirillum* and phosphobacteria when compared with control. Mengistu and Singh (1999) recorded the highest bulb horizontal and vertical diameters by using *Azospirillum brasilense* + VAM + 50 kg N. The treatment VAM + *Azospirillum brasilense* + 25 kg P produced the highest number of bulbs, shoot dry weightm while leaf number were highest using *Azospirillum brasilense* + 50 kg N + 25 kg P. Muthuramalingam *et al.* (2001) reported that interaction effect revealed that application of 60:60:30 kg NPK per ha, FYM, *Azospirillum* and phosphobacterium along with the closest spacing recorded the largest bulb and highest shape index. Alkaff *et al.* (2002) found that the highest rate of increase in bulb weight was observed with the mineral fertilizer, followed by the biofertilizer and FYM. The highest rate of total yield increase was recorded with FYM followed by the mineral fertilizer and biofertilizer. Sule *et al.* (2002) studied the impact of biofertilizers (*Azospirillum, Azotobacter, Rhizobium* and phosphate solubilizing bacteria) on the productivity of onion. Their results showed that the average productivity of biofertilizer users and non users was 20.05 and 18.13 t per ha., respectively. Balemi (2003) reported that inoculation of efficient *Azotobacter* could save up to 50 percent of N fertilizers without significant effect on plant growth and yield. Similarly, Devi *et al.* (2003) reported that

higher yields of crop and net returns were obtained with the application of 75 kg N + 45 kg P per ha + *Azospirillum* + phosphatika. Jayathilake *et al.* (2003) stated that application of biofertilizers, organic manures and chemical fertilizers increased bulb yield by 22 percent over their control. Yadav and Vijayakumari (2003) reported that application of *Azotobacter* either alone or in combination with nitrogen significantly increased onion yield over the uninoculated control. The maximum increase in plant height was obtained with *Azotobacter* in combination with 75 and 100 kg N per ha, respectively. Aswani *et al.* (2005) studied that effect of 4 levels of N (25, 50, 75 and 100 kg/ha) and 2 sources of biofertilizers i.e., *Azotobacter* and *Azospirillum* as seedling dipping, seed and soil treatments. They founed that application of 100 kg N combined with *Azotobacter* as seedling dipping gave the highest bulb yield and fresh weight of the bulb. The maximum bulb yield was obtained by Yadav *et al.* (2005) with *Azospirillum* biofertilizer application. Utilization of biofertilizers is very successful in minimizing chemical fertilizers in different vegetable crops (Shaheen *et al* 2007). Finally, Tawfik (2008) stated that microbein, nitrobein and rhizobacterin are commercial bio-fertilizers which gave the same effect of full dose of mineral nitrogen application.

The major objective of the present study was to investigate the effect of some sources of organic fertilizers, some commercial bio-fertilizers and their combinations on the growth, yield and chemical content of onion bulbs under Siwa Oasis conditions.

MATERIALS AND METHODS

The field experiments were conducted during the two successive winter season of 2004/2005 and 2005/2006 at Siwa Oasis South West Matroh Governorate, Egypt (26.0°N, 29.0°E and 0-22 m under mean sea level). Siwa Oasis is one of Egypt's isolated settlements located between the Qattara depression and the Egyptian Sand Sea in the Libyan Desert, nearly 50 km east of the Libyan border, and 300 km west of Marsa Matroh. The aim of the study was to investigate the effect of organic manure and bio-fertilizers on onion (*Allium cepa* L.) cv. Giza 20 grown on sandy soil (Table, A) containing no organic matter (Table, B) irrigated by drip irrigation system with saline water (Table, C).

Onion seedlings were transplanted during the first week of December of both growing seasons. Seedlings (60 days old) were transplanted on one row of one meter wide at 10 cm apart. The experimental unit was 1/400/fed. (10.5 m long and one meter wide). Split plot design in three replicates was used. The treatments were source of organic manures i.e., farmyard, sheep and poultry which were added during soil preparation at rate of 30, 20 and 10 m^3 /fed., respectively and arranged in the main plots, Their chemical analysis are shown in Table (D). while biofertilizers (nitrobeine, phosphorene and mixture of nitrobeine plus phosphorene (1:1) and control treatment (un-inoculated) were distributed randomly in the sub-plots. Nitrobeine is responsible for fixation of atmospheric nitrogen, while phosphorene is phosphate dissolving bacteria (PDB). Onion seedlings were dipped at

transplanting time for 5 minutes in suspension of the investigated biofertilizers. Biofertilizers were added at rate of 3 kg/fed. according to the recommendation of Ministry of Agriculture, Egypt. The recommended dose of N.P.K. fertilizer (250 kg ammonium, sulphate(20.5%N), 250 kg calcium superphosphate (15.5% P_2O_5) and 200 kg potassium sulphate (48% K_2O) per feddan, for all treatments). Calcium super phosphate was added during soil preparation, while ammonium sulphate and potassium sulphate were divided into two equal parts applied after 4 and 8 weeks from transplanting.

After 14 weeks from transplanting 5 plants were taken randomly from each plot to measure growth parameters, i.e. plant height, number of leaves/ plant, fresh and dry weight/plant. Also, total yield and its components (bulb and neck diameter and bulb fresh and dry weight were determined after 160 days from transplanting. Drying of 50% leaves is the indication of maturity. The bulbs were harvested manually after 10 – 15 days from stopping irrigation.

Table (A): Mechanical properties of the experimental soil at Khamisa Research Station.

Depth (cm)	Particle size distribution (%)				Texture class
	Coarse sand	Fine sand	Silt	Clay	
0-30	46.8	28.2	15.4	9.6	Sandy soil
30-60	50.0	25.9	18.0	6.1	

Table (B): Chemical properties of the experimental soil at Khamisa Research Station.

Depth (cm)	pH	EC (dS/m)	O.M %	Saturation soluble extract							
				Soluble anions (meq / L)				Soluble cations (meq / L)			
				CO_3^{--}	HCO^-_3	SO_4^{--}	Cl^-	Ca^{++}	Mg^{++}	Na^+	K^+
0-30	7.4	2.3	-	-	4.3	1.4	3.7	4.4	1.3	2.9	0.3
30-60	7.8	3.7	-	-	4.9	1.5	2.4	4.8	1.8	2.3	0.4

Table (C): Chemical analysis of the irrigation water at Khamisa Research Station.

pH	EC (dS/m)	Soluble anions (meq/l)				Soluble cations (meq/l)			
		CO^{--}_3	HCO^-_3	SO^{--}_4	Cl^-	Ca^{++}	Mg^{++}	Na^+	K^+
7.8	11.18	-	8,05	41.61	89.29	42.40	12.52	82.01	2.04

Table (D): The chemical analysis of the used organic manures

Chemical content	farmyard manure		sheep manure		poultry manure	
	%	Kg/30m^3	%	Kg/20m^3	%	Kg/10m^3
Moisture	60.18	-	50.32	-	25.33	-
Organic matter	48.45	4035	60.75	3316	70.11	2615
Total nitrogen	0.54	45.14	0.80	43.68	1.50	55.95
Phosphorus as P_2O_5	0.45	34.27	0.70	38.22	1.00	37.30
Potassium as K_2O	0.59	49.32	0.70	38.22	1.42	52.97
Weight of m^3 (kg)	**700**		**550**		**500**	

Also, chemical composition: minerals content of N, P and K % (oven dried bulb) were estimated using wet ashing method according to Johnson

and Ulrich (1959). The total nitrogen was determined according to the method of Huphries (1965) by a modified micro-Kjildahle apparatus. But, Phosphorus was determined calorimetrically according to the method of Frie, *et al.* (1964). While, Potassium was measured using Flame photometer as described by Brown and Lilliland (1964). Total soluble solids (TSS %) were determined by using Carl Zies refractometer, according to A.O.A.C. (1994). Carbohydrate content were determined according to the method of Dubois *et al.* (1956). Mechanical and chemical analysis of the experimental soil are shown in Tables (A and B). which were carried out according to Black and Editor (1965) and Jackson (1967). Analysis of irrigation water of Khamisa location is shown in Table (C) according to Richards (1954).

Statistical analysis:

All the obtained data were statistically analyzed of variance according to Snedecor and Cochran (1967). The treatment means were compared using the L. S. D. test as described by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

1 - Vegetative Growth characters:

1-1- Effect of organic manures:

Results in Table (1,a) showed the effects of different sources of organic manures on growth characteristics of onion plants under study namely, plant height, number of leaves per plant, fresh and dry weight per plant. The highest values were obtained from application of poultry manure treatment at rate of 10 m^3/fed. followed by farmyard manure(30 m^3/fed.) and later sheep manure (20 m^3/fed.). The same trend of results observed in the two growth seasons. These results go along with nitrogen and potassium content of the applied manures as indicated in Table (D). Obtained results are in agreement with those obtained by Somners and Sutton (1980) who reported that the total N and P contents of poultry manures and litters are among the highest of all animal manures. Castellanos and Pratt (1981) added that 60 percent of the organic N in poultry manure was available, due to its rapid mineralization and poultry manure was recognized as a valuable source of plant nutrients for crops. Another interpretation, the increase of plant growth obtained with poultry manure application may be due to increasing availability of soluble phosphorus in soil solution (Wamcke and Siregar, 1992). Also, poultry manure contains growth promoting substances like enzymes and hormones, besides plant nutrients which improve soil fertility and plant productivity (Bhuma, 2001)

1-2- Effect of bio-fertilizers:

Data in Table (1,a) showed that mixture of nitrobeine plus phosphoreine treatment, followed by phasphorene significantly increased plant height, number of leaves per plant, fresh and dry weight per plant, in both growing seasons. The results agree with those recorded by El-Sheekh (1997), El-Shaikh (2005) and Shaheen *et al* (2007) on onion. The increment in vegetative growth characters may be due to the release of fixed atmospheric nitrogen and increasing availability of phosphorus in the root zone (Abdalla, 2002). Tawfik (2008) added that microbeine, nitrobeine and

rhizobacterin are commercial bio-fertilizers which gave the same effect of full dose of mineral nitrogen application.

1-3- Effect of the interaction:

Data in Table (1,b) revealed that all characters of plant growth during both investigated growth seasons was increased with using the combinations of organic manures and bio-fertilizers. The highest values of all growth characters were obtained with application of mixtures of nitrobeine and phasphorene combined with poultry manure treatment. These results are in harmony with those reported by Abd-Elrazzag (2002) who reported that growth of plants increased significantly with addition of sheep manure and inorganic fertilizer. The results may be due to the role of bio-fertilizers i. e. nitrobeine which fix atmospheric nitrogen and increase the available nitrogen to plant and the role of phosphorene on hydrolyzing the insoluble phosphate into soluble one (Subbo-Rao, 1988). Organic fertilizers contain nutrients, organic acids which occur in decomposition which, in turn, increase the benefits of nutrients (Anonymous, 2010).

Table (1,a): Effect of organic manures and bio-fertilizers on onion vegetative growth, in 2004 / 2005 and 2005 / 2006 growing seasons.

Treatments	Plant height (cm)		No. of leaves		Fresh weight/plant (g)		Dry weight/plant (g)	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Sheep manure	45.62	44.17	5.59	5.21	89.74	87.45	16.37	17.72
FYM manure	49.48	47.90	6.96	7.10	97.56	93.78	18.76	17.51
Poultry manure	55.96	54.29	7.65	7.87	114.41	113.54	19.88	21.28
LSD (5%)	**1.57**	**1.36**	**0.44**	**0.27**	**2.03**	**2.05**	**0.72**	**0.43**
Without	33.09	31.77	3.17	3.27	66.09	63.25	12.98	13.28
Nitrobeine	36.93	35.83	5.16	5.19	74.21	74.04	12.93	14.04
Phosphoren	38.52	37.27	5.68	5.66	78.56	77.15	14.05	14.39
Nit+ Phos.	42.52	41.49	6.18	6.08	82.86	80.34	15.04	14.81
LSD (5%)	**2.08**	**2.23**	**0.25**	**0.50**	**3.19**	**3.04**	**0.87**	**0.60**

Nit. = Nitrobeine Phos. = Phosphorene

Table (1,b): Effect of the interaction between organic manures and bio-fertilizers on onion vegetative growth, in 2004 / 2005 and 2005 / 2006 growing seasons

Organic manure	Inocu-lation	Plant height (cm)		No. of leaves		Fresh weight/plant (g)		Dry weight/plant (g)	
		1st	2nd	1st	2nd	1st	2nd	1st	2nd
Sheep manure	**Without**	41.42	39.58	3.61	3.94	79.02	76.35	14.86	16.03
	Nit.	45.45	43.93	5.33	4.89	90.13	88.22	15.82	18.73
	Phos.	45.28	44.41	6.16	5.56	94.60	92.17	16.94	17.97
	Nit+Phos.	50.34	48.77	7.25	6.46	95.23	93.08	17.87	18.15
Farmyard manure (FYM)	**Without**	43.74	42.44	4.30	4.79	89.81	84.40	17.96	17.72
	Nit.	51.51	49.97	7.02	7.33	95.84	93.29	18.21	16.79
	Phos.	49.87	48.00	8.11	7.99	97.08	95.12	18.44	17.12
	Nit+ Phos.	52.83	51.19	8.40	8.31	107.50	102.30	20.43	18.41
Poultry manure	**Without**	47.21	45.07	4.78	4.35	95.53	92.23	19.11	19.37
	Nit.	50.74	49.43	8.30	8.53	110.86	114.65	17.70	20.64
	Phos.	58.94	56.66	8.45	9.08	122.55	121.32	20.83	22.46
	Nit+ Phos.	66.93	65.98	9.08	9.53	128.71	125.97	21.88	22.67
LSD (5%)		**3.61**	**3.86**	**0.44**	**0.87**	**5.52**	**5.27**	**1.50**	**1.04**

Nit. = Nitrobeine Phos. = Phosphorene

2 - Yield and its components:

2-1- Effect of organic manures:

The data obtained concerning yield and its components (bulb diameter, bulb fresh and dry weight /plant and total yield ton/fed.) are presented in Table (2, a). The best values were obtained with application of poultry manure treatment followed by farmyard manure. The same trend of the results was observed in the two growth seasons. These results go along with nitrogen and potassium content of the applied manures as indicated in Table (D). Obtained results are in agreement with those obtained by Abbey (2000) who reported that application of 3 t per ha poultry manure plus 100 kg NPK, gave the highest bulb yield of onion. On the other hand, Abd-Elrazzag (2002) studied the effect of chicken manure, sheep manure and inorganic fertilizer on yield and nutrients uptake by onion. He found that the yield increased significantly with sheep manure and inorganic fertilizer. The superiority of poultry manure in yield enhancement can be interpreted in the light of Somners and Sutton (1980) findings who reported that the total N and P contents of poultry manures and litters are among the highest of all animal manures. Castellanos and Pratt (1981) reported that poultry manure surpassed other manures which may be due to its rapid mineralization and it was recognized as a valuable source of plant nutrients for crops. Wamcke and Siregar (1992) added that the increase in yield due to increasing availability of phosphorus in the soil solution.

2-2- Effect of bio-fertilizers:

Data in Table (2, a) showed that yield and its components parameters were significantly favored by using bio-fertilizers. Results of both seasons cleared that using mixtures of nitrobeine and phasphorene gave the highest yield and its components followed by using nitrobeine but the highest values of neck diameter (not desired character) was recorded with not inoculated treatment. The results agree with those reported by Rizk and Shafeek (2000), Ali, *et al*. (2001) and Amer, *et al*. (2003). Tawfik (2008) stated that microbein, nitrobein and rhizobacterin are commercial bio-fertilizers which gave the same effect of full dose of mineral nitrogen application**.** This result may be due to the role of bio-fertilizers i. e. nitrobeine on fixation of nitrogen from atmosphere which, in turn, increase the availability of nitrogen to plant and the role of phasphorene on hydrolyzing the insoluble phosphate into soluble from.

2-3- Effect of the interaction:

Results cleared that the yield and its components, were significantly increased by using combination of organic manures and bio-fertilizers as shown in Table (2,b). The highest values of total yield and its components were recorded with using poultry manure in combination with mixture of nitrobeine and phosphorene. These results were true in both growing seasons. The results are in agreement with those obtained by Muthuramalingam *et al.* (2001). They reported that application of 60:60:30 kg NPK per ha and FYM combined with *Azospirillum* and phosphobacterium recorded the largest onion bulb. Alkaff *et al.* (2002) obtained the highest increase in bulb weight with the mineral fertilizer, followed by the biofertilizer and FYM. The highest rate of increase in total yield/fed was recorded with

FYM, followed by the mineral fertilizer and biofertilizer. Jayathilake *et al.* (2003) on onion showed that application of biofertilizers, organic manures and chemical fertilizers increased bulb yield by 22 percent over their control. Yadav and Vijayakumari (2003) reported that application of *Azotobacter* either alone or in combination with mineral nitrogen significantly increased onion yield over the uninoculated control by 20-31 and 32-56%, respectively. Later, Yadav *et al.* (2005) added that the maximum bulb yield was found with addition 75 percent of the recommended P_2O_5 combined with *Azospirillum* biofertilizer application. Aswani *et al.* (2005) noticed that application 100 kg N in combination with *Azotobacter* as seedling dipping gave the highest bulb yield and fresh weight of bulb, followed by 75 kg N in combination with *Azotobacter* as seedling dipping.

Table (2, a): Effect of organic manures and bio-fertilizers on onion yield and its components in 2004 / 2005 and 2005 / 2006 growing seasons.

Treatments	Bulb diameter (cm)		Neck diameter (cm)		Bulb weight/plant (g)		Dry weight/plant (g)		Total yield (ton/fed)	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Sheep manure	6.02	5.39	1.62	1.69	71.03	63.82	9.96	9.04	5.39	5.40
FYM manure	6.53	5.84	1.47	1.56	80.09	72.11	9.19	9.26	7.01	7.08
Poultry manure	7.39	6.62	1.33	1.41	94.89	88.69	10.06	10.21	8.96	8.80
LSD (5%)	**0.21**	**0.17**	**0.04**	**0.07**	**5.23**	**3.83**	**0.36**	**0.34**	**0.65**	**0.54**
Without	4.37	3.88	1.24	1.25	47.59	41.69	6.11	6.47	3.04	2.96
Nitrobeine	4.87	4.37	1.10	1.17	60.51	56.30	7.18	6.66	4.79	4.40
Phosphoren	5.08	4.55	1.07	1.16	67.19	62.47	7.97	7.66	5.68	5.70
Nit+ Phos.	5.61	5.06	1.00	1.08	70.72	64.16	7.95	7.73	7.86	8.22
LSD (5%)	**0.27**	**0.27**	**0.04**	**0.03**	**4.99**	**5.78**	**0.56**	**0.60**	**0.70**	**0.66**

Nit. = Nitrobeine Phos. = Phosphorene

Table (2,b): Effect of the interaction between organic manures and bio-fertilizers on onion yield and its components in 2004 / 2005 and 2005 / 2006 growing seasons.

Organic manure	Inocu-lation	Bulb diameter (cm)		Neck diameter (cm)		Bulb weight/plant (g)		Dry weight/plant (g)		Total yield (ton/fed)	
		1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Sheep manure	**Without**	5.47	4.83	1.72	1.73	55.08	48.31	8.11	8.70	3.67	3.52
	Nit.	6.00	5.36	1.71	1.71	61.44	56.67	9.13	7.99	3.54	3.42
	Phos.	5.98	5.42	1.61	1.69	78.84	70.07	11.04	9.29	4.73	4.41
	Nit+Phos.	6.64	5.95	1.43	1.63	88.76	80.24	11.54	10.19	9.62	10.25
Farmyard manure (FYM)	**Without**	5.77	5.18	1.77	1.74	64.66	54.22	6.95	7.56	4.07	3.98
	Nit.	6.80	6.10	1.39	1.57	76.52	68.57	9.18	9.31	6.20	4.83
	Phos.	6.58	5.86	1.42	1.56	93.37	90.04	11.20	11.21	7.37	8.08
	Nit+Phos.	6.97	6.25	1.29	1.38	85.82	75.61	9.44	8.98	10.38	11.43
Poultry manure	**Without**	6.23	5.50	1.48	1.54	70.63	64.22	9.36	9.61	4.40	4.35
	Nit.	6.70	6.03	1.29	1.42	104.09	99.97	10.41	9.33	9.41	9.33
	Phos.	7.78	6.91	1.27	1.38	96.55	89.77	9.65	10.14	10.61	10.30
	Nit+Phos.	8.84	8.05	1.27	1.30	108.30	100.80	10.83	11.74	11.43	11.21
LSD (5%)		**0.48**	**0.47**	**0.08**	**0.06**	**8.64**	**10.02**	**0.96**	**1.04**	**1.21**	**1.15**

Nit. = Nitrobeine Phos. = Phosphorene

3 - Chemical content:

3-1- Effect of organic manures:

Data in Table (3,a) indicated that poultry manure application showed the highest values of carbohydrate, T.S.S., N, P and K content of onion bulb, followed by farmyard manure. The same trend of results was observed in the two growth seasons. These results go along with nitrogen and potassium content of the applied manures as indicated in Table (D). The results are in agreement with those obtained by Castellanos and Pratt (1981) who stated that 60 percent of the organic N in poultry manure was available due to its rapid mineralization. They added that poultry manure was recognized as a valuable source of plant nutrients for crops. Abd-Elrazzag (2002) found that increasing rate of sheep and chicken manure, significantly increased nitrogen content of onion bulb, while P and K contents had low level. Abou- Hussein, *et al.* (2003) on potato found that application of chicken manure increased total carbohydrates and reduced the content of TSS.

Table (3, a): Effect of organic manures and bio-fertilizers on onion chemical content in 2004 / 2005 and 2005 / 2006 growing seasons.

Treatments	Carbohydrate %		T.S.S. %		N %		P %		K %	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Sheep manure	12.48	11.77	10.32	10.72	1.38	1.24	0.34	0.36	1.44	1.41
FYM manure	12.33	12.94	11.25	11.63	1.66	1.71	0.38	0.38	1.54	1.50
Poultry manure	14.99	13.86	13.06	13.18	2.13	2.14	0.50	0.46	1.70	1.74
LSD (5%)	**0.30**	**0.42**	**0.77**	**0.33**	**0.08**	**0.13**	**0.02**	**0.04**	**0.04**	**0.09**
Without	9.35	9.14	7.38	7.71	0.94	0.96	0.16	0.16	0.74	0.75
Nitrobeine	9.89	9.08	8.44	8.70	1.39	1.37	0.27	0.28	1.13	1.11
Phosphoren	10.13	9.90	8.94	9.05	1.20	1.17	0.34	0.34	1.36	1.31
Nit+ Phos.	10.43	10.45	9.87	10.07	1.64	1.58	0.45	0.42	1.46	1.48
LSD (5%)	**0.42**	**0.45**	**0.64**	**0.54**	**0.09**	**0.14**	**0.02**	**0.06**	**0.06**	**0.10**

Nit. = Nitrobeine Phos. = Phosphorene

Table (3, b): Effect of the interaction between organic manures and bio-fertilizers on onion chemical content in 2004 / 2005 and 2005 / 2006 growing seasons.

Organic manure	Inocu-lation	Carbohydrate %		T.S.S. %		N %		P %		K %	
		1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Sheep manure	**Without**	11.29	10.47	8.56	9.61	1.11	1.05	0.20	0.22	0.93	0.95
	Nit.	13.19	12.10	10.36	10.66	1.32	1.20	0.28	0.29	1.33	1.22
	Phos.	12.66	11.93	10.99	10.78	1.22	1.12	0.34	0.33	1.58	1.55
	Nit+Ph	12.78	12.59	11.34	11.84	1.87	1.58	0.55	0.58	1.95	1.94
Farmyard manure (FYM)	**Without**	12.48	12.65	10.62	10.30	1.12	1.21	0.21	0.22	1.00	1.09
	Nit.	11.83	11.75	11.14	12.13	1.83	1.78	0.30	0.29	1.35	1.27
	Phos.	12.06	12.99	11.24	11.65	1.55	1.60	0.43	0.46	1.91	1.71
	Nit+Ph	12.97	14.38	12.02	12.43	2.15	2.27	0.57	0.56	1.89	1.93
Poultry manure	**Without**	13.64	13.45	10.35	10.94	1.53	1.60	0.22	0.19	1.02	0.96
	Nit.	14.53	12.46	12.25	12.00	2.40	2.51	0.51	0.53	1.83	1.96
	Phos.	15.82	14.67	13.51	13.75	2.04	1.97	0.59	0.58	1.94	1.98
	Nit+Ph	15.97	14.84	16.14	16.02	2.53	2.49	0.67	0.55	2.00	2.04
LSD (5%)		**0.73**	**0.78**	**1.11**	**0.94**	**0.16**	**0.25**	**0.04**	**0.10**	**0.10**	**0.17**

Nit. = Nitrobeine Phos. = Phosphorene

3-2- Effect of bio-fertilizers:

Mixture of nitrobeine and phasphorene treatment gave the best chemical content of onion bulb, followed by using phosphorene, except nitrogen content which was higher with nitrobene than phosphorene treatment in both growing seasons as shown in Table (3,a). Other investigators recorded a similar trend (El-Sheekh, 1997; El-Shaikh, 2005 and Shaheen *et al.* 2007 on onion). Tawfik (2008) stated that microbein, nitrobein and rhizobacterin are commercial bio-fertilizers which gave the same effect of full dose of mineral nitrogen application. The increment of chemical content of onion bulbs may be due to the release of fixed atmospheric nitrogen and increasing availability of phosphorus in the root zone (Abdalla, 2002).

3-3- Effect of the interaction:

Data presented in Table (3,b) showed that the highest values of carbohydrate, T.S.S. and N, P and K concentrations in onion bulb were obtained with application of poultry manure combined with mixture of nitrobeine and phasphorene as compared with other treatments. The results were true in both growing seasons. The obtained results are in agreement with those obtained by Amer *et al.* (2003), Yadav and Vijayakumari (2003) and (Anonymous, 2010).

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تحسين إنتاجية البصل تحت ظروف واحة سيوة

رشاد حسن غدية

قسم الإنتاج النباتي مركز بحوث الصحراء

أجريت تجربة حقلية في التربة الرملية بواحة سيوة بمنطقة خميسة بجمهورية مصر العربية خلال الشتاء من عامي 2004-2005، 2005 - 2006، وكان نظام الري بالتنقيط بماء بدرجة ملوحة حوالي 7000 جزء في المليون. وكان الهدف من البحث دراسة تأثير التفاعل بين ثلاث مصادر من التسميد العضوي وأربع معاملات من التلقيح البكتيري علي نباتات البصل صنف جيزة 20. استعمل ثلاث مصادر من الأسمدة العضوية هي سماد المزرعة ، سماد الغنم ، سماد الدواجن بمعدل 30 ،20 ،10 متر مكعب للفدان علي التوالي أضيفت أثناء إعداد الأرض للزراعة . كما استعملت أربعة معاملات من التلقيح البكتيري وهي بدون تلقيح ، التلقيح بالنيتروبين ، بالفوسفورين ، بمخلوط من النيتروبين و الفوسفورين بمعدل 3كيلوجرام للفدان من كل تلقيح حسب توصية وزارة الزراعة حيث تم غمس الشتلات قبل الزراعة لمدة خمسة دقائق في معلق الملقحات. وقد تم دراسة صفات النمو (ارتفاع النبات – عدد الأوراق – الوزن الطازج والجاف للنبات) وكذلك تقدير المحصول ومكوناته (قطر البصلة والعنق – الوزن الطازج والجاف للبصلة والمحصول الكلي للفدان) بالإضافة إلي تقدير المحتوي الكيماوي للبصلة (الكربوهيدرات الكلية –المواد الصلبة الذائبة و النتروجين والفوسفور والبوتاسيوم في الأبصال)

وأوضحت النتائج المتحصل عليها الآتي:-

1- أدت المعاملة بسماد الدواجن إلي تفوق نمو النباتات والمحصول والمكونات الكيميائية للأبصال بالمقارنة بالأسمدة العضوية الأخرى

2- أدت المعاملة بالملقحات الحيوية إلي تفوق نمو النباتات والمحصول والمكونات الكيميائية للأبصال بالمقارنة بالمعاملة بدون تلقيح. وكان أفضل المعاملات البكتيرية هي خليط النيتروبين و الفوسفورين

3- أظهرت نتائج التفاعل أن المعاملة بسماد الدواجن بمعدل 10 متر مكعب للفدان ومخلوط التلقيح البكتيري من النيتروبين والفوسفورين أدت إلي الحصول علي أعلي وأفضل القيم لجميع الصفات تحت الدراسة.

قام بتحكيم البحث

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