Nitrogen Soil Dressing And Foliar Spraying By Sugar And Amino Acids As Affected The Growth, Yield And Its Quality Of Onion Plant

Shaheen, A.M.; Fatma A. Rizk; Hoda A. M. Habib and M.M.H. Abd El - Baky

Vegetable Research Department, National Research Centre, Cairo, Egypt.

Abstract: Field experiments were conducted during the two seasons of 2007/2008 and 2008/2009 at the Experimental Farm of National Research Centre at El-Nobaria (110 km far Cairo City) to study effect of the nitrogen application (as soil dressing) at two rates, i.e. 90 and 120 N units/fed., and the supplying of amino mix compound and sugar (as foliar spraying) on onion plant productivity. The main important findings are as follows: 1. The vigor plant growth parameters, i.e. plant length, average number of leaves per plant, fresh and dry weight of whole onion plant and its different organs as well as the heaviest bulbs yield and its better physical and chemical properties, all of them were associated with addition the higher nitrogen rate, i.e. 120 N units/fed. 2.Foliar spraying by each amino mix compound and or sugar as individually or together resulted plants more vigor and heavier bulbs yield as well as better values of nutritional elements (N, P, K, Fe, Mn, Zn and Cu) if compared with that control plants. Moreover, the vigorously of plant growth and the highest bulbs yield with the best physical and chemical constituents all them were obtained with the foliar spraying by amino acids and sugar together. 3.Soil dressing by 120 N units/fed., and the foliar spraying by amino acids and sugar as one compound resulted the highest values of plant growth characters and heaviest bulbs yield with the best parameter values of nutritional elements, but the differences were not significantly at 5 % level in most cases. [Journal of American Science 2010;6(8):420-427]. (ISSN: 1545-1003).

Keywords: Field experiments; plant growth; sugar; nutritional element

1. Introduction

In Egypt, onion (*Allium cepa*, L.) is one of the most important vegetable crops. The total grown area amounted by 87.47 thousands fed., produced about 1147.6 thousands ton and by average 13.12 tons/fed. (AERI, 2006). Increasing productivity of onion with good quality is an important target by the growers for local market and exportation. The productions of the best fields require that the soil must have favorable physical, chemical nutritional and biological conditions. Now more than ever the importance of an adequate supply of plant nutrients to ensure efficient crop production is being recognized. Generally, from the horticultural point of view, the yield of any plant is the most important target from any plantation. The role of nitrogen levels has been associated with so many significant increasing in the plant growth and total yield of onion (Aisha *et al*., 2007; Shaheen *et al*., 2007) and / or garlic (Shaheen, 1999 and Ali, *et al*., 2001) and potatoes (Belonger *et al*., 2000; Shafeek *et al*., 2001; Love *et al*., 2005 and Faten *et al*., 2008).

Moreover, it is known that, every plant like any organism needs certain components for growth over or above soil. The basic component of living cells is protein, which are formed by sequence of amino acids. The requirement of amino acids in essential quantities is well known as a means to increase yield and overall quality of corps (Sanaa, *et al*., 2001; Slviero *et al*., 2001; Attoa et al., 2002; El-Shabasi *et al*., 2005; Awad *et al*., 2007; Al-Said and Kamal, 2008; Faten *et al*., 2010).

In spite of the plants require 3 essential elements, light, water, temperature and nutrients, etc. to thrive and produce optimum yield, but plants produce sugars such as glucose and sucrose. These sugars are needed to produce energy promote growth and aide in the processes of respiration and transpiration, consequently effected plant growth and its productivity. Many workers studied the response of plant to external application of sugar, and reported that, sugars have important signal functions all stages of plant's life cycle (Gibson, 2000; Riou-Khamlichi *et al*., 2000; Smeekens, 2000; Flnkelstein and Gibson, 2000; Pourtau *et al*., 2004; Filip Rolland *et al*., 2006).

Therefore, this study was conducted to elucidate the effect of soil dressing by two levels of nitrogen fertilizer and foliar application of amino acids mixture and/or sugar and their interactions on growth, bulbs yield of onion and its some physical and chemical properties under the newly sandy soil.

2. Materials and Methods:

Two field studies were carried out during the two seasons of 2007/2008 and 2008/2009 at the Experimental Farm of National Research Centre at Nobaria (Behera Governorate), Egypt to investigate effect of the application of nitrogen (as soil dressing) at two rates and supplying amino mix compound and/or sugar (as foliar spraying) on onion plant productivity. The studied used treatments were as follows:

A. Soil dressing:

1. Soil dressing of 90 N units/fed.

2. Soil dressing of 120 N units/fed.

The amount of nitrogen rates was added as urea form at two equal quantities (60 and 90 days after transplanting).

B. Foliar spraying:

1. Foliar spraying by amino mix compound (1000 ppm).

2. Foliar spraying by sugar (2000 ppm).

3. Foliar spraying by amino mix + sugar.

4. Control treatment (water foliar spraying).

The foliar spraying applied 3 times, starting at 60 days old with 15 days internals.

Table (1) shows the chemical composition of amino mix compound.

Nutritional elements g. / 100 cm.		Amino acids Mg. / 100 cm.				Vitamins mg. / 100 cm.	
Elements	Value						
Zn	2	Aspartic acid	249	Methionine	180	Vitamin B_1	0.8
Fe	1.5	Threnine	45	Iso- Leucine	52	Vitamin B_2	2.4
Mn	0.5	Serine	56	Tyrosine	38	Vitamin B_6	1.2
Mg	0.004	Glutamic acid	55	Phenylalanine	22	Vitamin B_{12}	0.82
Cu	0.004	Glycine	50	Histidine	12	Folic acid	4.2
Ca	0.025	Alanine	100	Lysine	40	Pantothenic acid	0.52
Br	0.056	Prolein	38	Arginine	20	Nicotine B_5	1.14
S	0.01	Valine	68	Tryptophan	20		
Co	0.03	Cysteine	44				

Source: Agrico international (www.agricointernational.com).

The soil texture of experiments was sandy with 95.3 % sand, 0.4 % silt and 4.3 % clay. The pH was 7.9 and E.C. was 2.0 ds/m.

All treatments were arranged in split plot design with 3 replicates. Where the two Nitrogen rates as soil dressing were assigned in the main plots and the 4 foliar spraying treatments were arranged randomly within the sub-plots. The total area of each sub-plot amounted by 14.0 sq. m. and contained 4 ridges (5 m long and 0.7 m width).

Onion seedlings cv. Giza 20 were planted on the 4th week of December in the two seasons of 2007 and 2008, where seedlings were grown on the two sides of ridge with 20 cm apart. All experiments were fertilized by phosphorus as calcium super-phosphate (16.0 % P_2O_5) at rate of 300 kgs / fed., and applied during soil preparing and before transplanting. Also, potassium sulphate (48 % K_2O) at rate of 200 kgs./fed. were divided two equal proportion and applied at 60 and 90 days after seedlings. The different agricultural practices of onion, such as irrigation, weeds, disease and pest controls were applied according the advice of Egyptian Agricultural Ministry.

A random sample of 3 plants were taken from every experimental plot at 120 days old to determine the vegetative growth characters, i.e. plant length, leaves number, length and diameter of each bulb and its neck, as well as fresh and dry weight of whole plant and its different organs.

At harvesting time, 150 days after transplanting, the total bulbs yield as tons/fed., were recorded. In the same time sample of 6 bulbs were taken randomly to record the physical onion properties, i.e. length, diameter and average weight of bulb.

In over dry weight of onion bulbs, N, P, K elements were determined according the methods described by Pregl (1945); Trough and Mayer (1939) and Brown and Lilleland (1946), respectively. However, Fe, Mn, Zn and Cu were analysis and determined by that methods of Chapman and Pratt (1978).The protein percentages in bulbs were accounted by multiplying nitrogen content by 6.25.

All obtained data were statistically analyzed according to the method described by Gomez and Gomez (1984).

3. Results and Discussion:

A. Plant growth:

Onion plant growth characters as expressed by plant length, leaves number, length and diameter of blub and neck, fresh and dry weight of whole plants and its different organs as affected by the interaction between nitrogen fertilizer as urea at two rates, i.e. 90 and 120 units of N per feddan and the application of some promotion substances (sugar and/or Amino acids) are presented in Tables (2 and 3) for the two experimental seasons.

All onion plant growth parameters recorded their highest values with that plants which received the higher rate of nitrogen fertilization, i.e. 120 N units/fed., whereas, the statistical analysis of the obtained data indicated that the differences within the two rates of nitrogen were great enough to reach the 5 % level of significant. These findings were true in both experiments for all plant growth measurements, except average leaves number per plant in two seasons and whole dry weight of plant and its leaves in 1st seasons.

With regard to the parameters of bulb and it neck dimension as affected by the different treatments its response followed the same pattern of change like that of plant growth characters.

Generally, it could be concluded that, the plant growth of onion plant was more vigor when the nitrogen application was increased up to 120 N units/fed., These superior amounted by 33.1 and 36.04 % for fresh weight of whole plant and by 3.0 and 21.8 % for dry weight of whole plant respectively in 1st and 2nd experiment.

Nitrogen fertilization increased planting growth and its measurements could be attributed to nitrogen role in enhancing plant capacity in protein synthesis leading to an increase in building up carbohydrates and this in turn resulted in increases in plant growth characters. The obtained results are in harmony with there before applied (Ali *et al*., 2001; Love *et al*. 2005; Aisha *et al*., 2007 and Shaheen *et al*., 2007).

Concerning to the response of onion plant growth measurements to the application of some plant growth promotion substances, i.e. foliar spraying by sugar and/or amino mix compound are shown in Table (2 and 3) for the two seasons of 2007/2008 and 2008/2009. However, the presented data indicated that, applied both sugar and amino mix together resulted in the most vigor plant growth, followed in descending order by that plants received amino mix, then that treated by sugar as individually. It means that, the poorest plant growth of onion plant was noticed with that plants no received any plant growth promotion substances. Also, the recorded data indicated that, no great enough difference was found within the 3 promotion substances. However, the statistical analysis for the obtained data reveals that, the significant variation only recorded within the control and the applied sugar and/or amino mix as individually or as a compound treatments with the control treatment. These findings were true in both experiments.

It could be concluded that, the onion plants which treated with the amino mix + sugar gained the vigor plant growth. This might be attributed to that; amino acid mix contains more amino acids, vitamins as well as some growth regulators (Table, 1). Whereas, the previous studies have proved that, amino acids, can directly or indirectly influenced the physiological activities of the plants (El-Shabase *et al*., 2005, Awad *et al*., 2007; Al-Said and Kamal, 2008 and Faten *et al*., 2010). Also, the vigorously of plant growth of onion plants might be attributed to the role of sugar which needed to produce energy, promote growth, consequently affected plant growth (Flnkelstein and Gibson, 2002 and Filip Rolland *et al*., 2006).

Regarding the interaction within the soil dressing by nitrogen at rate of 120 units/fed., and the foliar spraying by the compound of sugar with amino mix the obtained data for the two experimental seasons are presented in Tables 2 and 3.

It is clear that, under the higher levels of nitrogen fertilizer (120 N units/fed.), the foliar application of sugar and amino mix together resulted the strongest plant growth in both experiments. The statistical analysis of the recorded data reveals that the interaction treatments had no significant differences for all plant growth measurements in two experiments, except fresh and/or dry weight of leaves.

Table (2): Effect of the application by sugar and amino compound under two rates of nitrogen fertilizers on plant growth of onion grown in newly lands during 2007/2008 season.

Treatments				Bulb (cm)		Neck (cm)		Fresh weight (g.)				Dry weight (g.)			
Urea	Compounds	Plant length (cm)	No. of leaves/ plant	Length	Diameter	Length	Diameter	Leaves	Neck	Bulb	Total	Leaves	Neck	Bulb	Total
90 Unit N. /fed.	Control	37.97	10.00	4.47	5.37	9.23	1.57	11.57	8.83	68.13	88.53	3.37	2.53	15.03	19.43
	Sugar (S)	41.67	11.00	5.13	5.80	10.30	1.70	12.10	9.80	110.53	132.43	4.37	3.37	15.47	23.70
	Amino(A)	41.83	11.00	5.43	5.97	10.93	1.80	17.17	8.80	113.07	139.03	4.33	3.57	20.73	28.47
	S.+ A.	44.97	11.00	5.57	6.10	11.90	1.97	19.00	10.67	129.73	159.40	4.33	5.50	19.90	27.93
Mean		**41.61**	**10.75**	**5.15**	**5.81**	**10.59**	**1.76**	**14.96**	**9.53**	**105.37**	**129.85**	**4.10**	**3.74**	**17.78**	**24.88**
120 Unit N. /fed.	Control	39.90	10.33	5.03	5.90	9.90	1.70	12.87	9.03	86.27	108.17	3.67	2.93	12.83	20.93
	Sugar (S)	45.33	10.33	5.80	6.30	10.30	2.23	16.77	10.33	121.93	149.03	4.43	4.23	15.03	23.20
	Amino(A)	46.27	11.33	6.30	6.60	12.10	2.07	18.03	11.23	133.70	162.97	4.33	3.90	20.23	28.63
	S.+ A.	47.60	13.00	6.53	7.37	12.10	2.20	20.70	11.03	141.10	172.83	5.60	5.10	17.23	29.73
Mean		**44.78**	**11.25**	**5.92**	**6.54**	**11.10**	**2.05**	**17.09**	**10.41**	**120.75**	**148.25**	**4.51**	**4.04**	**16.33**	**25.63**
Average	Control	38.93	10.17	4.75	5.63	9.57	1.63	12.22	8.93	77.20	98.35	3.52	2.73	13.93	20.18
	Sugar (S)	43.50	10.67	5.47	6.05	10.30	1.97	14.43	10.07	116.23	140.73	4.40	3.80	15.25	23.45
	Amino(A)	44.05	11.17	5.87	6.28	11.52	1.93	17.60	10.02	123.38	151.00	4.33	3.73	20.48	28.55
	S.+ A.	46.28	12.00	6.05	6.73	12.00	2.08	19.85	10.85	135.42	166.12	4.97	5.30	18.57	28.83
L.S.D. at 5%	Fertilizers	**1.03**	**N.S.**	**0.75**	**0.52**	**0.04**	**0.22**	**0.78**	**0.77**	**15.26**	**14.45**	**N.S.**	**0.22**	**1.30**	**N.S.**
	Compounds	**3.05**	**N.S.**	**0.58**	**0.73**	**1.73**	**0.30**	**3.30**	**1.09**	**13.89**	**15.14**	**0.78**	**0.48**	**3.01**	**3.09**
	Interactions	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**

Table (3): Effect of the application by sugar and amino compound under two rates of nitrogen fertilizers on plant growth of onion grown in newly lands during 2008/2009 season.

Treatments				Bulb (cm)		Neck (cm)		Fresh weight (g.)				Dry weight (g.)			
Urea	Compounds	Plant length (cm)	No. of leaves/ plant	Length	Diameter	Length	Diameter	Leaves	Neck	Bulb	Total	Leaves	Neck	Bulb	Total
90 Unit N. /fed.	Control	65.67	9.00	3.87	3.67	7.83	0.90	15.79	15.40	74.63	105.82	3.15	7.52	8.05	18.72
	Sugar (S)	66.67	8.33	4.03	3.80	8.57	1.27	21.31	19.37	84.10	124.78	3.95	8.15	12.37	24.47
	Amino(A)	78.33	10.00	4.17	4.20	9.63	1.53	23.25	26.43	96.63	146.32	4.52	7.71	16.37	28.60
	S.+ A.	83.00	9.67	4.63	4.27	10.77	1.70	30.44	46.43	129.67	206.54	4.34	8.53	18.87	31.74
Mean		**73.42**	**9.25**	**4.18**	**3.98**	**9.20**	**1.35**	**22.70**	**26.91**	**96.26**	**145.86**	**3.99**	**7.98**	**13.91**	**25.88**
120 Unit N. /fed.	Control	71.33	8.67	4.30	3.73	7.63	1.17	17.11	17.13	75.20	109.44	3.51	5.57	10.13	19.21
	Sugar (S)	72.67	12.00	6.33	4.33	9.07	1.70	25.27	48.83	113.03	187.14	4.03	6.73	19.37	30.13
	Amino(A)	88.93	11.67	5.80	4.90	12.37	1.50	31.50	49.57	141.57	222.63	4.24	5.87	25.27	35.37
	S.+ A.	91.50	10.67	8.03	5.97	14.23	1.73	35.77	54.16	184.60	274.53	4.52	8.57	28.40	41.49
Mean		**81.11**	**10.75**	**6.12**	**4.73**	**10.83**	**1.53**	**27.41**	**42.42**	**128.60**	**198.44**	**4.08**	**6.68**	**20.79**	**31.55**
Average	Control	68.50	8.83	4.08	3.70	7.73	1.03	16.45	16.27	74.92	107.63	3.33	6.54	9.09	18.97
	Sugar (S)	69.67	10.17	5.18	4.07	8.82	1.48	23.29	34.10	98.57	155.96	3.99	7.44	15.87	27.30
	Amino(A)	83.63	10.83	4.98	4.55	11.00	1.52	27.38	38.00	119.10	184.48	4.38	6.79	20.82	31.99
	S.+ A.	87.25	10.17	6.33	5.12	12.50	1.72	33.11	50.30	157.13	240.53	4.43	8.55	23.63	36.61
L.S.D. at 5%	Fertilizers	**N.S.**	**N.S.**	**1.70**	**0.71**	**0.84**	**0.16**	**1.78**	**15.06**	**18.73**	**30.58**	**N.S.**	**0.31**	**4.46**	**4.37**
	Compounds	**5.67**	**N.S.**	**1.15**	**0.73**	**1.48**	**0.21**	**2.36**	**11.28**	**21.74**	**23.89**	**0.51**	**1.37**	**2.99**	**3.28**
	Interactions	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**3.34**	**N.S.**	**N.S.**	**33.79**	**N.S.**	**N.S.**	**N.S.**	**N.S.**

B. Total bulbs yield and its physical properties:

Table (4) shows clearly that, total bulbs yield as tons/fed., as well its some physical properties (average wt. and length and diameter of bulb)are affected by the application of rates of nitrogen fertilizers as soil dressing and some plant growth promotion substances as foliar spraying in both experiments.

Nitrogen fertilizer in the form of urea at 120 kg N/fed., as soil dressing resulted the heaviest tonnage of onion bulbs yield in both experiments if compared with applying the lower rate, i.e. 90 kg. N/fed., whereas, the amounted total yield recorded 17.07, 14.84 and 18.39 and 15.72 tons/fed., respectively for applied 120 and 90 N units in 1st and 2nd seasons. By short words, the higher nitrogen application rate increased total bulbs yield by 15.0 and 17.0 % over applied the lower rate respectively in 1st and 2nd experiment.

It could be summarized that, the higher total bulbs yield as tons/fed., was associated with the higher rate of nitrogen fertilizer.

The vigorously of plant growth under the application of higher nitrogen rate may be attributed to that nitrogen stimulated stem elongation throughout the increment in the number and size of cells. It is noteworthy to mentioned that nitrogen is essential for plant growth as it is a constituents of all proteins and nucleic acids and hence of all protoplasm. As the level of nitrogen supply increases compared with the lower rate, the extra protein produced allows the plant leaves to grow larger and hence to have a larger surface available for photosynthesis proportional to the

amounts of nitrogen supply (Russel, 1982). The obtained results are in good agreement with the results of Shaheen, 1989; Yildirim *et al*., 2007; Aisha *et al*., 2007 and Shaheen *et al*., 2008).

Regarding to the some physical properties of onion bulb at harvesting time, i.e. length, diameter, and average weight, as affected by the application of nitrogen fertilizers during the two experiments of 2007/2008 and 2008/2009) the obtained data are showed in Table (4). It is obvious that, the better physical properties of onion bulbs were correlated with the higher nitrogen (120 N units /fed.) application. Whereas, the superiority in average bulb weight, length and diameter amounted by 14.0, 15.1 and 11.6 % respectively in 1st season and by 12.9, 5.4 and 9.4 % for the same respective in 2nd season.

Generally, the presented data of Table (4) clearly shows that, the higher bulbs yield with the better physical properties were produced with supplying nitrogen fertilizer at higher rate, i.e. 120 N units/fed. These findings are in good accordance with those which obtained by Shaheen, 1999; Ali *et al*., 2001; Love *et al*., 2005 and Shaheen *et al*., 2007.

Foliar spraying by sugar, Amino mix as individually and/or as compound with sugar significantly affected total bulbs yield of onion and its some physical properties, these were true in both experiments. However, foliar spraying of onion plant with sugar and amino mix together resulted the heaviest tonnage yield (19.5 and 19.06 tons/fed., for 1st and 2nd season respectively) followed in descending order by that plants which received amino mix as individual, then by that treated with sugar. Generally, the shown data of Table (4) indicate that, using sugar, amino mix as individual and/or as compound gained the higher bulbs yield if compared with the control treatment. Moreover, the statistical analysis of the obtained data reveals that, the differences within using the 3 promotion substances were not great enough to be significantly, for most measurements. These findings were true in the two experimental seasons.

The physical properties of onion bulbs i.e. average weight, length and diameter followed the same trend of direction for their response to the foliar application treatments by sugar and/or amino mix, like total bulbs yield as mentioned before.

It could be concluded that, total bulbs yield as ton/fed., as well as its physical properties recorded their higher and best values when supplied by sugar and/or amino mix as individually or as together, if compared the untreated plants.

This superiority might be due to that amino mix compound contains many amino acids as well as some growth regulators and Vitamins which stimulate and enhancement the metabolism processes in plant tissues. Moreover, the application of sugar as foliar, it supply the plant organism by the energy which promote synthesis of plant organs consequently, it could be summarized that, onion plants which received amino mix with sugar together as foliar spraying gained the heaviest bulbs yield and its physical measurements. The obtained results are in some direction with that of Paul *et al*., 2001; Sanaa *et al*., 2001; Pourtan, *et al*., 2004; Awad *et al*., 2007 and Al-Said and Kamal, 2008.

The interaction within addition two rates of nitrogen fertilizer as soil dressing and foliar application of sugar, amino mix had no significance effect on the total bulbs yield and/or its physical properties. This indicated that, each interaction factor may be act as independently the total bulbs yield and its properties.

Table (4): Effect of the application by sugar and amino compound under two rates of nitrogen fertilizers on total bulbs yield and its some physical properties of onion grown in newly lands during 2007/ 2008 and 2008/2009 seasons.

Treatments		Yield (ton/ fed.)	Average weight of bulb	Bulb (cm)		Yield (ton/ fed.)	Average weight of bulb	Bulb (cm)	
Urea	Compounds			Length	Diameter			Length	Diameter
		2007/2008				2008/2009			
90 Unit N. /fed.	Control	8.85	80.30	6.11	5.26	10.73	92.70	3.43	4.51
	Sugar (S)	14.40	129.45	6.76	6.24	16.68	146.33	6.00	6.20
	Amino(A)	17.60	154.95	7.30	6.90	17.58	164.83	7.33	6.90
	S.+ A.	18.50	160.11	7.42	7.14	17.88	168.20	7.05	7.11
Mean		**14.84**	**131.20**	**6.90**	**6.39**	**15.72**	**143.01**	**5.95**	**6.18**
120 Unit N. /fed.	Control	12.24	111.62	6.93	6.17	13.80	110.77	3.50	5.50
	Sugar (S)	16.50	151.67	7.86	7.03	19.65	173.43	7.01	6.92
	Amino(A)	19.03	167.15	8.33	7.21	19.84	178.21	7.40	7.45

	S.+ A.	20.50	168.28	8.63	8.11	20.25	183.79	7.15	7.16
Mean		**17.07**	**149.68**	**7.94**	**7.13**	**18.39**	**161.55**	**6.27**	**6.76**
Average	Control	10.54	95.96	6.52	5.72	12.27	101.73	3.47	5.01
	Sugar (S)	15.45	140.56	7.31	6.64	18.17	159.88	6.51	6.56
	Amino(A)	18.32	161.05	7.82	7.06	18.71	171.52	7.37	7.18
	S.+ A.	19.50	164.19	8.03	7.63	19.06	176.00	7.10	7.14
L.S.D. at 5%	Fertilizers	**2.00**	**5.32**	**0.61**	**0.51**	**1.70**	**13.37**	**0.30**	**0.19**
	Compounds	**2.57**	**17.72**	**1.11**	**0.97**	**1.35**	**11.87**	**0.57**	**0.35**
	Interactions	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**

C. The nutritional values:

The response of elemental nutrients values, i.e. N, P, K, Fe, Mn, Zn and Cu as well as protein content of onion bulbs as affected by the application of N at rate of 90 and 120 units/fed., and the foliar spraying with sugar and Amino mix as stimulate substances are presented in Table (5 and 6) for the two experimental seasons.

As a general, the higher rates of nitrogen application as soil dressing, the higher nutritional values were obtained. Moreover, the statistical analysis of the obtained data reveals that, the differences within the two rates of nitrogen supplying were great enough to reach the 5 % level. These results held well in the two experiments. This superiority might attributed to that urea at high rate resulted a promotion effect on plant growth measurements as well as total bulbs yield and its physical properties, consequently, these might be reflected on the chemical properties of onion bulb.

The obtained results are in good accordance with those of Shaheen, 1999; Ali *et al*., 2001; Aisha *et al*., 2007 and Shaheen *et al*., 2007.

The foliar spraying by the mixture of sugar with amino mix compound results the highest values of N, K, Fe, Zn and Cu as well as protein content. However, P and Mn values recorded their highest values when onion plants were received amino mix compound, but the variation between this treatment and that plants which treated with the mixture of sugar + amino mix as together was not great enough to reach the significant level.

Generally, it could be concluded that, the foliar spraying by the mixture of sugar + amino mix compound resulted the rich nutritional value of N, P, K, Fe, Mn, Zn and Cu as well as protein content in bulb tissues.

The soil dressing by nitrogen fertilizer at higher rate, i.e. 120 units/fed., and the foliar application by mixture of sugar + amino mix resulted the best chemical consistent by expressed as N, P, K, Fe, Mn, Zn and Cu as well as protein. The statistical analysis of the collected data indicated that the variation within the different interaction treatments were no great to be significantly for most nutritional elements in both seasons. These findings might be attributed to that each factor of the interaction acts independently.

Similar trend was obtained by Paul *et al*., 2001; El-Shabasi *et al*., 2005; Filip Rolland *et al*., 2006; Awad *et al*., 2007 and Al-Said and Kamal, 2008. Whereas a they studies reported that, each amino acids and sugar application caused a promotion effected directly or indirectly the physiological activities in building the essential substances such as carbohydrates, protein, fats, vitamins as well as the nutritional elements (N, P, K, Fe, Mn, Zn, Cu …etc.).

Table (5): Effect of the application by sugar and amino compound under two rates of nitrogen fertilizers on chemical content of onion in newly lands during 2007/2008 season.

Treatments		%				ppm			
Urea	Compounds	Protein	N	P	K	Fe	Mn	Zn	Cu
90 Unit N. /fed.	Control	8.60	1.38	0.230	0.480	254.00	26.00	30.67	10.33
	Sugar (S)	8.85	1.42	0.310	0.540	261.33	27.00	34.00	11.33
	Amino(A)	9.31	1.49	0.400	0.610	271.67	30.00	36.00	12.00
	S.+ A.	9.65	1.54	0.347	0.640	278.00	28.67	36.67	13.00
Mean		**9.10**	**1.46**	**0.329**	**0.578**	**266.25**	**27.92**	**34.33**	**11.67**
120 Unit N. /fed.	Control	8.71	1.39	0.250	0.510	251.67	27.67	36.00	9.67
	Sugar (S)	9.04	1.45	0.363	0.717	289.00	31.00	38.33	12.00

	Amino(A)	9.60	1.54	0.463	0.733	305.00	35.67	40.33	12.67
	S.+ A.	10.23	1.64	0.437	0.770	314.67	33.33	42.33	14.67
Mean		**9.40**	**1.50**	**0.386**	**0.680**	**290.08**	**31.92**	**39.25**	**12.25**
Average	Control	8.66	1.39	0.240	0.495	252.83	26.83	33.33	10.00
	Sugar (S)	8.95	1.43	0.347	0.623	275.17	29.00	36.17	11.67
	Amino(A)	9.46	1.51	0.432	0.672	288.33	32.83	38.17	12.33
	S.+ A.	9.94	1.59	0.382	0.705	296.33	31.00	39.50	13.83
L.S.D. at 5%	Fertilizers	**0.12**	**0.02**	**0.026**	**0.006**	**2.80**	**1.08**	**1.56**	**0.36**
	Compounds	**0.19**	**0.03**	**0.014**	**0.014**	**2.61**	**0.78**	**0.91**	**0.91**
	Interactions	**N.S.**	**N.S.**	**N.S.**	**0.020**	**3.69**	**N.S.**	**N.S.**	**N.S.**

Table (6): Effect of the application by sugar and amino compound under two rates of nitrogen fertilizers on chemical content of onion in newly lands during 2008/2009 season.

Treatments		%				ppm			
Urea	Compounds	Protein	N	P	K	Fe	Mn	Zn	Cu
90 Unit N. /fed.	Control	8.50	1.36	0.250	0.470	251.33	28.33	33.67	10.67
	Sugar (S)	9.00	1.44	0.393	0.553	257.00	29.33	35.33	12.33
	Amino(A)	9.15	1.46	0.420	0.610	259.00	33.00	37.33	14.33
	S.+ A.	9.67	1.55	0.360	0.633	264.33	30.00	36.33	13.33
Mean		**9.08**	**1.45**	**0.356**	**0.567**	**257.92**	**30.17**	**36.17**	**13.17**
120 Unit N. /fed.	Control	8.96	1.43	0.287	0.483	255.67	28.33	35.33	11.67
	Sugar (S)	9.15	1.46	0.390	0.717	265.67	34.00	40.00	14.67
	Amino(A)	10.06	1.61	0.467	0.743	275.67	37.67	42.33	16.00
	S.+ A.	10.29	1.65	0.443	0.790	298.33	34.67	44.67	16.67
Mean		**9.61**	**1.54**	**0.397**	**0.683**	**273.83**	**33.67**	**40.58**	**14.75**
Average	Control	8.73	1.40	0.268	0.477	253.50	28.33	34.50	11.17
	Sugar (S)	9.07	1.45	0.392	0.635	261.33	31.67	37.67	13.50
	Amino(A)	9.60	1.54	0.443	0.677	267.33	35.33	39.83	15.17
	S.+ A.	9.98	1.60	0.402	0.712	281.33	32.33	41.50	16.00
L.S.D. at 5%	Fertilizers	**0.04**	**0.01**	**0.034**	**0.018**	**2.59**	**0.62**	**0.36**	**1.56**
	Compounds	**0.12**	**0.02**	**0.039**	**0.019**	**1.82**	**1.35**	**0.92**	**0.90**
	Interactions	**0.18**	**0.03**	**N.S.**	**0.0**	**2.57**	**N.S.**	**N.S.**	**N.S.**

Corresponding author
Fatma A. Rizk
Vegetable Research Department, National Research Centre, Cairo, Egypt.

4. References

1. Agricultural Economic Research Institute (AERI), 2006.

2. Aisha, H.A.; Fatma, A. Rizk, A.M. Shaheen and Mona M.Abdel-Mouty (2007). Onion plant growth, bulbs yield and its physical and chemical properties as affected by organic and natural fertilization. Res. J. Agric. Bio. Sci., 3(5): 380 – 388.

3. Ali, A.H.; M.M. Abdel-Mouty and A.M. Shaheen (2001). Effect of bio nitrogen organic and inorganic on the productivity of garlic (*Allium sativum* L.) plants. Egypt. J. Appl. Sci., 16(3): 173 – 188.

4. Al-Said, M.A. and A.M. Kamal (2008). Effect of foliar spray with folic acid and some amino acids on flowering, yield and quality of sweet pepper. J. Agri. Sci., Mansoura Univ., 33(10): 7403 – 7412.

5. Awad, H.E.M.; H.E.M. Wahba and A.A. Frahat (2002). Effect of some amino acids and sulpher fertilizers on growth and chemical composition of *Iberis armara* L. Plant. Egypt. J. Hort., 29 (1): 17 – 32.

6. Awad, El-M.M.; A.M. Abd El-Hameed and Z.A. El-Amin (2007). Effect of Glycine, Lysine and nitrogen fertilizer rates on growth, yield and chemical composition of potato. J. Agric. Sci. Mansoura Univ., 32(10): 8541 – 8551.

7. Belonger, G.; J.G. Walsh; Richords, P.H. Milburn and N. Ziad, (2000). Yield response of two potato cultivars to supplemental irrigation and N fertilization in new brun swick. Amer. Potato. Res., 77: 11 – 21.

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

9. Chapman, H.D. and P.F. Pratt (1978). Methods of analysis for soils, plants and waters. Univ. California, Div. Agric. Sci. Priced Pub. 4034.

10. El-Shabasi, M.S.; S.M. Mohamed and S.A. Mahfouz (2005). Effect of foliar spray with some amino acids on growth, yield and chemical composition of garlic plants. The 6th Arabian Conf. for Hort., Ismailia, Egypt.

11. Faten, S. Abd El-Aal; A.M. Shaheen; A.A. Ahmed and Asmaa, R. Mahmoud (2010). The effect of foliar application of urea and amino acids mixtures as antioxidants on the growth and yield and characteristics of squash. Res. J. Agric. Biol. Sci. (Accepted).

12. Faten, S. Abdel-Aal; A.M. Shaheen and Fatma A. Rizk (2008). The effect of foliar application of GA_3 and soil dressing of NPK at different levels on the plant productivity of potatoes (*Solanum tuberosum* L.). Research Journal of Agriculture and Biological Science, 4(5): 384 – 311.

13. Filip Rolland; Elena Baena-Conzalelz and Jen Sheen (2006). Annals Review of Plant Biology. Volume, 57, Page, 675 – 209.

14. Flnkelstein, R.R. and S.I. Gibson (2002). ABA and sugar interactions regulating development: Cross-talk or voices in a cord? Curr. opin. Plant Biol. 5: 26 – 32.

15. Gibson, S.I. (2000). Plant sugar-response pathways. Part of a complex regulatory web. Plant Physiol. 124: 1532 – 1539.

16. Gomez, K.A. and A.A. Gomez (1984). Statistical procedures for Agricultural Research (Second Ed.),pp. 457 – 423. John Wiley and Sons. Inter. Sci. Pub. New York.

17. Love, S.L.; J.C. Stark and T. Saloiz (2005). Response of four potato cultivars to rate and timing of nitrogen fertilizer. Amer. J. Potato, Res., 82: 21 – 30.

18. Paul, M.K.; Pelling, T. and O. Godding (2001). Enhancing photosynthesis with sugar signals. Trends in Plant Sci. 6, 197 – 200.

19. Pourtan, N.; M. Mare's; S. Purdy; N. Quentinum; I.A. Rue and A. Wingler (2004). Interactions of abscisic acid and sugar signaling in the regulation of leaf senescence. Planta, 219: 765 - 772.

20. Pregl, F. (1945). "Quantitative organic micro analysis" 1st Ed. Cl. And A-chrdill, 1td. London.

21. Riou-Khamlichi, M.; J.M. Menges; T.A. Healy Murray (2000). Sugar control of the plant cell cycle: differential regulation of Arabidopsis D-type cycle. Mol. Cell Biol, 20: 4513 – 21.

22. Russel, R.S. (1982). Plant root system, 1st Ed. ELBS. UK,pp. 17 – 18.

23. Sanaa, A.M.Z.; S.I. Ibrahim and H.A.M.S. Eldeen (2001). The effect of naphthalene acetic acid (NAA). Salicylic acid on growth, fruit setting, yield and some correlated components in dry bean. Annals of Agric. Sci. Cairo, 46 (2): 451 – 463.

24. Shafeek, M.R.; M. El-Desuki and A.M. Shaheen (2001). Growth and yield of some potato cultivars affected by sources of fertilization. Egypt. J. Appl. Sci., 16 (4): 242 – 260.

25. Shaheen, A.M. (1989). Effect of soil and foliar application of nitrogen, phosphorus and potassium on the growth and yield of cucumber (*Cucumis sativus*, L.) plants. Egypt. J. Appl. Sci. 4(3): 301 – 309.

26. Shaheen, A.M. (1999). The effect of different nitrogenous fertilizers on the production of garlic (*Allium satimul* L.). African J. Agric. Soc., 16: 1-2.

27. Shaheen, A.M.; Fatma A. Rizk and S.M. Singer (2007). Growing onion plants without chemical fertilization. Research J. Agric. Bio., Sci., 3(2): 95 – 104.

28. Shaheen, A.M ; Fatma A. Rizk and S.M. Singer (2008). The effect of foliar application of urea and More-Beans mixture of the growth, yield and characteristics of two pea cultivars. Egypt. J. Appl. Sci; 23(10A): 341 – 351.

29. Smeekens, S. (2000). Sugar – induced signal transduction in plants. Ann. Rev. Plant Physiol. Plant Mol. Biol. 51: 49 – 81.

30. Slviero, P.; C. Zoniand and B. Frullanti (2001). Efficiency of on notifying growth regulator on industrial tomatoes. Informatory Agro. 2001, 57 (14): 73 – 75.

31. Troug, E. and A. H. Mayer (1939). Improvement in the denies calorimetric method for phosphorus and arsenic Indian engineering chemical annual Ed., 1:136-139.

32. Yildirim, E.; I. Guvenc; M. Turani and A. Karata (2007). Effect of foliar urea application on quality growth mineral uptake and yield of broccoli (Brassica oleracea L., var.Italica). Plant soil Environ. 53(3): 120 – 128.

7/11/2010