

ORIGINAL ARTICLES

Influenced Of Some Stimulation On Onion Plant Substances Grown Under Low and/OR High Nitrogen Fertilizer Doses

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ABSTRACT

Field experiments were conducted during the two successive seasons of 2005/2006 and 2006/2007 at the experimental agriculture station at Noharia region Behara Governorate. The aim of these experiments were to study the influence of two nitrogen fertilization rates i.e. low (90 units/fed.) and high (120 units/fed.) as soil dressing as well as the foliar spraying of some organic acid (Gibberlic, Citric and Naphthyacetic acids) as promotion substances on the plant growth, yield and its physical and chemical properties of onion bulbs. The important obtained results are as following:

- Nitrogen fertilization of onion plant enhanced plant growth characters as expressed by plant length, fresh and dry weight of whole plant and its different organs, if added at higher rate (120 units/fed.). The total bulbs yield as ton/fed. as well as its physical properties followed the same pattern of changes. However, the application of higher nitrogen dose gained 0.672-1.228 tons more than lower dose. Generally, the nutritional values of onion tissues recorded higher constituents when nitrogen applied at higher rate.
- Foliar spraying of organic acids gained an enhancement in onion plant growth characters if compared with the checked plants. Moreover, using gibberlic acid (50 ppm) and/or Naphthyacetic acids (500 ppm) as foliar application 3 times at fortnightly intervals gave the best plant growth measurements. Also, onion bulbs yield and its physical and nutritional values followed the same pattern.
- The interaction within the two rates of nitrogen fertilizer and foliar spraying of 3 organic acids as promoter substances had no statistical significant effect on the plant growth, bulbs yield as well as the quality of onion yield.

Kew words: Onion, Stimulation, Low and High Nitrogen Fertilizer Doses.

Introduction

The total grown area of onion in Egypt amounted by 87.2 thousands fed., produced about 1147.6 thousands ton by an average 13.12 tons/fed. (AERI, 2006). The production 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.

Marguerite *et al.* (2006) showed that, the mean maximum increase in total nitrogen fertilizer against the zero -N treatment, was 34.3% and ranged from 10.5 to 54.77% and the improvement of N efficiency should be also achieved by splitting N fertilizer applications and by monitoring the crop nitrogen needs to match crop N requirements and mineral N supply throughout the growing season. Generally, N application had a great role associated with so many significant increasing in the plant growth and total bulbs yield (Abdel- Moez *et al.*, 1997; Abd-allah, 2001; Aisha *et al.*, 2007; Selim *et al.*, 2010; Shaheen *et al.*, 2010 and Shahzad *et al.*, 2010).

Moreover, many investigators treated vegetable plants with some substance as foliar spraying aiming to increase the ability of plant to accumulate more assimilation materials, hence increase the vigority of plant growth, consequently improve the vegetable yield and its physical and chemical consistents. Foliar spraying with some organic acids such as gibberlic acids, citric acids and naphthyacetic acids are studied by many workers and there are an agreement that these substances play a great role to cause an enhancement in plant growth and yield characters of vegetable plants (Carrera *et al.*, 2000; Shaheen *et al.*, 2007; Mona, Abdel-Mouty and Nadia, El-Greadly, 2008; Abdel- Aal, Faten, 2009 and Ghonam *et al.*, 2010).

This study aimed to investigate the response of onion plant to the addition of nitrogen fertilizer as soil dressing at low and high rates for those onion plants which sprayed by some organic substances as foliar application.

Materials and Methods

Field experiments were carried out during the two successive seasons of 2005/2006 and 2006/2007 at the Experimental Station of National Research Centre at Noharia region Behera Governorate, Egypt to study the effect of some plant growth promoters (Citric acids, (CA) Naphthyacetic acids (NPA) and Gibberlic acids, (GA) as foliar spraying for onion plants which received nitrogen fertilizer at low (90) and high (120 units/fed.).

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. value was 2.0 millimos/cm. All treatments were arranged in split plot design with 3 replicates. Nitrogen rates were distributed within the main plots, while, the foliar application of plant growth promoters substances were randomly arranged within the sub-plots. The area of each sub-plot was 14.0 m², which contained 4 ridges (5 m long and 0.7 m width). The nitrogen treatments were added as soil top dressing at two equal quantities, i.e. 45 and 75 days after transplanting date. However, the promotion substances were applied three times at fortnightly intervals i.e. 45, 60 and 75 days after transplanting date at concentration of 50, 500 and 500 ppm for GA, Citric acids and Naphthyacetic acids, respectively.

Onion seedlings cv. Giza 20 improved were trans planted on the 1st-week of December in the two experimental seasons. Whereas seedlings planted at 3 lines per ridge with 20 cm apart. All experimental plots, were applied phosphorus at rate of 48 P₂O₅ and potassium at rate of 100 K₂O units/fed. All phosphorus doses were added totally during soil preparation, but the amount of potassium were applied twice at 45 and 75 days after transplanting date. Generally, the different other agricultural practices of onion, such as irrigation, weeds, disease and pest controls were applied according the advice of Egyptian Ministry of Agricultural.

A random onion plant samples (4 plants per sub plot) were taken after 120 days to estimate the vegetative plant growth characters (plant length, leaves number, length and diameter of onion 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 date, the total bulbs yield as tons/fed., were recorded. In the same time sample of 6 bulbs were randomly taken to record the physical onion properties, i.e. length, diameter and average weight of bulb as well as total soluble solids. Wherears, the TSS values were determined by abbe refractometer (A.O.A.C., 1984). In oven dry weight of onion bulb samples, N,P and K elements were determined according to the methods described by Pregl (1945); Trough and Mayer, (1939) and Brown and Lilleland (1946), respectively. However, Fe, Mn, Zn and Cu were analyzed and determined by methods of Chapman and Pratt (1978). The protein percentages in bulbs were calculated by multiplying nitrogen content by 6.25. All obtained data were statistically analyzed according to the method described by Gomez and Gomez (1984).

Results and Discussion

Plant Growth Characteristics:

Data presented in Tables (1 and 2) as well as Figs.(1, 2, 3& 4) showed clearly the response of growth criteria's of onion plant expressed as plant length number of leaves per plant, and the dimension of neck and bulb (length and diameter) as well as total fresh and dry weight of whole plant and its different organs to the application of nitrogen fertilizer as soil top dressing and the foliar spraying by some growth regulators i.e., citric acids (CA), naphthyacetic acids (NPA) and gibberlic acids (GA3) during the two experimental seasons, of 2005/2006 and 2006/2007.

However, applying nitrogen fertilizer at higher rate (120 N units/fed.) resulted in vigour onion plant growth if compared with addition of lower rate (90 N units/fed.). These finding are true in both experiments. By short words, it could be concluded that, the tallest onion plant with the maximum leaves number, heaviest fresh and dry weight of whole plant and its different organs, all of these measurements were recorded with onion plant which supplied the higher nitrogen rate (120 N units/fed.).

This superiority of total fresh and dry weight of onion plants which received lower nitrogen rate amounted by 16.6 and 9.5% in the first season and by 5.3 and 15.6% in the second season, respectively. Generally, the differences within the two nitrogen rates are great to reach the 5% level of significances. These were true in both seasons and for all plant growth parameters.

It could be concluded that, the N fertilization of onion plant enhanced plant growth characters when added at higher rate. Whereas, nitrogen is present in the chlorophyll molecule and it is a main component of protein synthesis. Moreover, the advancing effect of nitrogen might be attribute to its role in enhancing plant capacity in protein synthesis, leading to an increase in building up carbohydrates, and this in turn resulted in increases the plant growth characters. Also, it is note worthy to mentioned that, nitrogen is essential for plant growth as it is constituent of protoplasm protein. As the level of nitrogen supply increases compared with other nutrients, the extra protein produced all the plant leaves to grow larger and hence to have a larger surface available to photosynthesis proportional to the amount of nitrogen supplied.

Many investigators studies the response of many vegetable plant to nitrogen fertilization and had results supported the obtained data such as Rizk Fatma (2001); Fatma Rizk *et al.* (2002); Saleh *et al.* (2003); Aisha *et al.* (2007); and Selim *et al.* (2010).

The foliar spraying with some plant growth regulators, i.e. citric acid, naphthyacetic acid and gibberlic acid, on onion plant growth are shown in Tables (1 and 2) and Figs. (1, 2, 3 & 4) for the two experiments. Whereas, all plant growth regulators used caused an enhancement in plant growth if compared with the checked plant treatment. Moreover, within the 3 plant materials, foliar spraying by GA at 50 ppm and/or by naphthyacetic acids at 500 ppm resulted in more vigor onion plant, whereas, the obtained data revealed that the differences within these two treatments recorded no significant differences for most plant growth criteria's. Generally, foliar application of citric acid caused a less enhancement of plant growth if compared the other two plant growth regulators.

The previous reviews in this view indicated that some chemical substances such as organic acid (Citric acid, Naphthyacetic acid and Gibberlic acid) could be used for promotion the metabolism processes (Bharat *et al.*, (1998); Fatma Rizk *et al.*, (2002); Mona Abdel-Mouty and Nadia El-Greadly (2008) and Abdel-Aal Faten (2009).

Table 1: Influence of nitrogen fertilization rates and foliar spraying of some growth regulators on vegetative growth of onion plant under drip irrigation conditions in El-Nubaria region in season of 2005/2006.

Treatments		Plant length (cm)	No. of leaves/plant	Neck (cm)		Bulb (cm)		Fresh weight (g)				Dry weight (g.)			
Nitrogen rates (unit N /fed.)	Growth regulators			Length	Diameter	Length	Diameter	Leaves	Neck	Bulb	Total	Leaves	Neck	Bulb	Total
90	Control	44.67	7.67	6.41	1.37	4.75	4.13	14.05	10.43	46.06	70.54	2.84	2.64	17.81	23.29
	Citric acid	46.33	6.33	6.46	1.80	5.30	4.57	16.47	13.37	89.26	119.11	3.45	3.61	19.71	26.77
	Naphthylaeetic acid	52.33	8.67	8.20	2.20	6.36	4.97	19.29	11.63	67.24	98.17	3.31	3.14	19.64	26.10
	GA ₃	50.33	9.67	10.79	1.87	5.27	4.70	19.23	16.22	74.84	110.29	3.57	3.33	21.45	28.35
	Mean	48.42	8.08	7.97	1.81	5.42	4.59	17.26	12.92	69.35	99.53	3.29	3.18	19.65	26.13
120	Control	45.33	8.67	6.49	1.67	6.38	4.70	18.09	14.42	53.52	86.02	3.10	2.91	16.47	22.47
	Citric acid	54.00	8.33	8.50	1.27	5.62	4.93	22.77	18.49	90.95	132.21	3.66	3.44	22.35	29.45
	Naphthylaeetic acid	56.67	9.00	8.71	1.57	8.05	6.07	24.31	19.36	84.94	128.61	4.06	3.76	20.39	28.20
	GA ₃	51.33	10.33	10.58	1.80	7.18	5.53	23.89	17.17	76.13	117.19	4.90	3.53	25.84	34.28
	Mean	51.83	9.08	8.57	1.58	6.81	5.31	22.26	17.36	76.39	116.01	3.93	3.41	21.26	28.60
Average	Control	45.00	8.17	6.45	1.52	5.57	4.42	16.07	12.43	49.79	78.28	2.97	2.77	17.14	22.88
	Citric acid	50.17	7.33	7.48	1.53	5.46	4.75	19.62	15.93	90.11	125.66	3.55	3.53	21.03	28.11
	Naphthylaeetic acid	54.50	8.83	8.46	1.88	7.21	5.52	21.80	15.50	76.09	113.39	3.69	3.45	20.02	27.15
	GA ₃	50.83	10.00	10.69	1.83	6.22	5.12	21.56	16.70	75.49	113.74	4.24	3.43	23.65	31.31
	Mean	49.17	8.58	8.00	1.68	6.14	5.11	20.28	15.33	76.44	114.25	3.61	3.41	20.74	27.61
L.S.D. at 5% level	Nitrogen	0.92	0.17	0.11	0.09	0.19	0.16	0.12	0.36	3.76	4.15	0.08	0.05	0.81	0.83
	Growth regulators	4.91	1.20	1.52	N.S.	1.08	0.42	3.51	2.85	8.12	9.10	0.46	N.S.	2.05	1.81
	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.	2.56

Table 2: Influence of nitrogen fertilization rates and foliar spraying of some growth regulators on vegetative growth of onion plant under drip irrigation conditions in El-Nubaria region in season of 2006/2007.

Treatments		Plant length (cm)	No. of leaves/plant	Neck (cm)		Bulb (cm)		Fresh weight (g)				Dry weight (g.)			
Nitrogen rates (unit N /fed.)	Growth regulators			Length	Diameter	Length	Diameter	Leaves	Neck	Bulb	Total	Leaves	Neck	Bulb	Total
90	Control	35.00	6.67	7.00	1.43	3.33	4.67	10.99	10.61	49.49	71.09	2.23	1.72	10.97	14.91
	Citric acid	42.33	8.00	11.73	1.50	3.67	5.07	17.29	13.27	68.36	98.92	2.73	2.79	11.72	17.24
	Naphthylaeetic acid	44.00	9.00	9.37	2.57	6.23	4.97	16.54	11.85	55.70	84.09	2.51	2.25	13.31	18.07
	GA ₃	45.33	9.33	8.77	1.90	4.00	5.67	15.40	17.30	63.34	96.03	2.84	2.36	13.38	18.58
	Mean	41.67	8.25	9.22	1.85	4.31	5.09	15.05	13.26	59.22	87.53	2.58	2.28	12.35	17.20
120	Control	34.00	7.33	5.33	1.20	3.67	4.77	12.62	11.63	47.44	71.69	2.43	2.16	12.79	17.37
	Citric acid	46.33	9.67	10.33	2.17	5.57	5.17	16.48	13.19	64.91	94.58	2.60	2.52	14.15	19.27
	Naphthylaeetic acid	50.67	8.33	13.77	2.50	6.67	5.77	17.39	12.17	67.66	97.22	2.87	2.60	15.66	21.13
	GA ₃	47.33	10.67	8.33	2.27	6.57	6.13	18.70	17.70	68.66	105.06	2.92	3.15	15.67	21.75
	Mean	44.58	9.00	9.44	2.03	5.62	5.46	16.30	13.67	62.17	92.14	2.70	2.61	14.57	19.88
Average	Control	34.50	7.00	6.17	1.32	3.50	4.72	11.81	11.12	48.46	71.39	2.33	1.94	11.88	16.14
	Citric acid	44.33	8.83	11.03	1.83	4.62	5.12	16.88	13.23	66.63	96.75	2.66	2.66	12.94	18.25
	Naphthylaeetic acid	47.33	8.67	11.57	2.53	6.45	5.37	16.96	12.01	61.68	90.65	2.69	2.42	14.48	19.60
	GA ₃	46.33	10.00	8.55	2.08	5.28	5.90	17.05	17.50	66.00	100.55	2.88	2.76	14.53	20.17
	Mean	43.26	8.63	10.51	2.19	5.34	5.41	16.67	13.10	63.06	92.23	2.61	2.56	13.63	18.54
L.S.D. at 5% level	Nitrogen	1.06	0.60	N.S.	0.06	0.35	0.32	0.76	0.15	2.23	2.07	0.08	0.13	0.29	0.12
	Growth regulators	2.68	1.73	1.91	0.35	0.97	N.S.	1.80	3.34	11.92	12.62	N.S.	N.S.	0.83	0.92
	Interactions	N.S.	N.S.	2.70	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

The interaction within the two treatments of nitrogen fertilizer (90 and 120 N units/fed.) and 4 treatments of growth regulators, i.e. (control, citric acid, naphthyacetic acid and gibberlic acid) as affected plant growth parameters of onion plant are showed in Tables (1 and 2) for the two seasons. It was cleared that, no significant

response of onion plant growth characters to the interaction treatments. These findings are true in both seasons for all plant growth measurements, except total dry weight of whole plant in the first season, and length of neck in the second season.

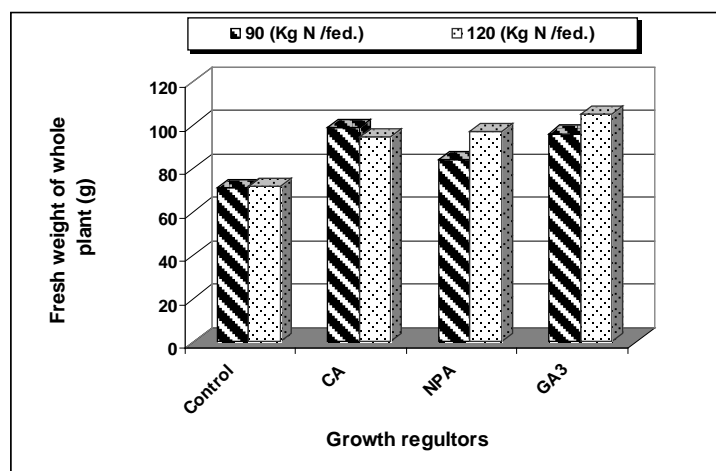


Fig. 1: Effect of nitrogen fertilization rates and foliar spraying of some growth regulators on fresh weight of onion plant during season of 2005/2006.

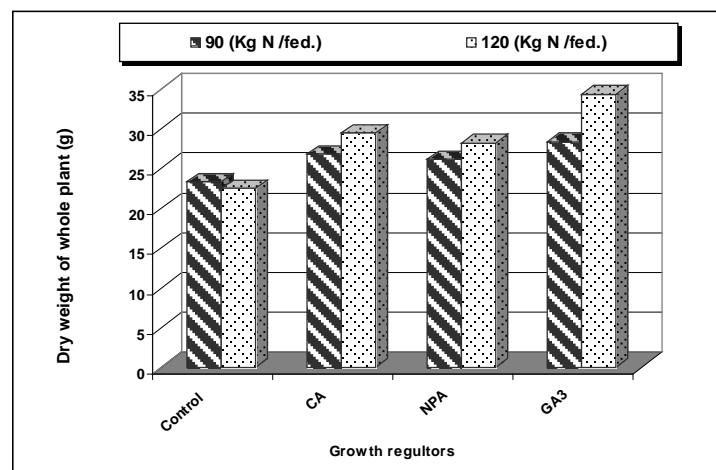


Fig. 2: Effect of nitrogen fertilization rates and foliar spraying of some growth regulators on fresh weight of onion plant during season of 2006/2007.

CA=Citric acids –NPA=Naphthyacetic acids –GA =Gibberlic acids

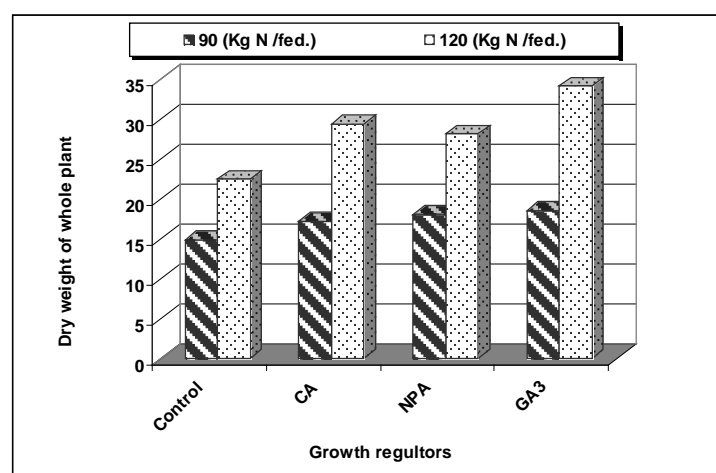


Fig. 3: Effect of nitrogen fertilization rates and foliar spraying of some growth regulators on dry weight of onion plant during season of 2005/2006.

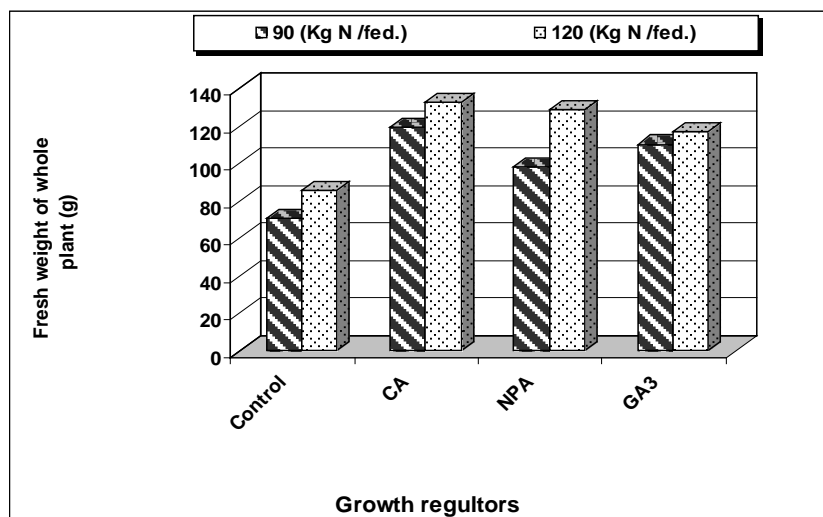


Fig. 4: Effect of nitrogen fertilization rates and foliar spraying of some growth regulators on dry weight of onion plant during season of 2006/2007.

CA = Citric acids – NPA = Naphthyacetic acids - GA = Gibberlic acids

B- Onion Bulbs Yield And Its Physical Properties:

The heaviest total bulbs weight as tons/fed. and/or average weight of bulb as gram Table (3) and Figs (5, 6, 7& 8), as well as the highest values of onion bulb dimension i.e., length and diameter were associated with that plants which received the highest N rate (120 N units/fed.) and the statistical analysis of the obtained data revealed that the differences within the two nitrogen treatments were great enough to reach the 5% level of significances. These findings are true in the two experimental seasons. However the tonnage of onion yields as tons/fed. increased by 7.00 and 3.74%, respectively, in the first and the second season when nitrogen fertilizer was added at rate of 120 units/fed. compared with the added rate of 90 units/fed. Generally, it could be concluded that, the addition higher rate of nitrogen fertilizer gained the biggest bulb size consequently the heaviest bulb yield.

This might be attributed to the great role of nitrogen in enhancement of metabolism processes due to the importance of nitrogen in building carbohydrates, protein and fats in the plant tissue, consequently nitrogen application gained a promotion in vegetative plant growth, which reflected on the improvement the onion yield and its components. The obtained results are in good agreement with Fatma Rizk *et al.*, (2002); Aisha *et al.*, (2007); Selim *et al.*, (2010) Shaheen *et al.*, (2007 and 2010); and Shahzad *et al.*, (2010). Regarding the total soluble solids values, the obtained data indicated that, the highest values of TSS were associated with the addition of lower nitrogen rate.

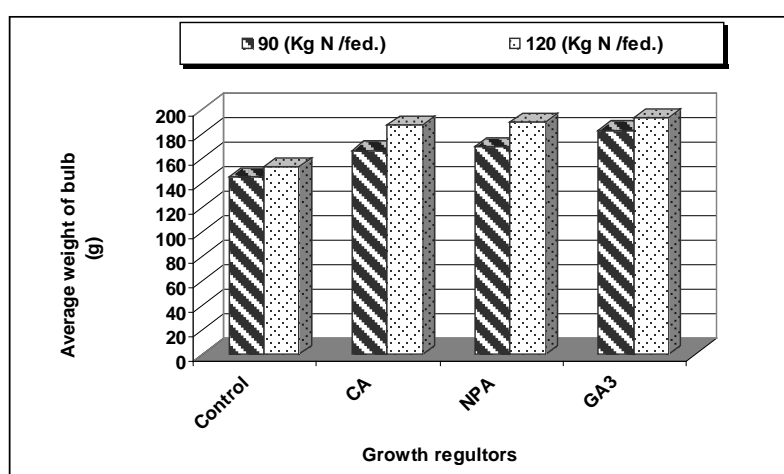
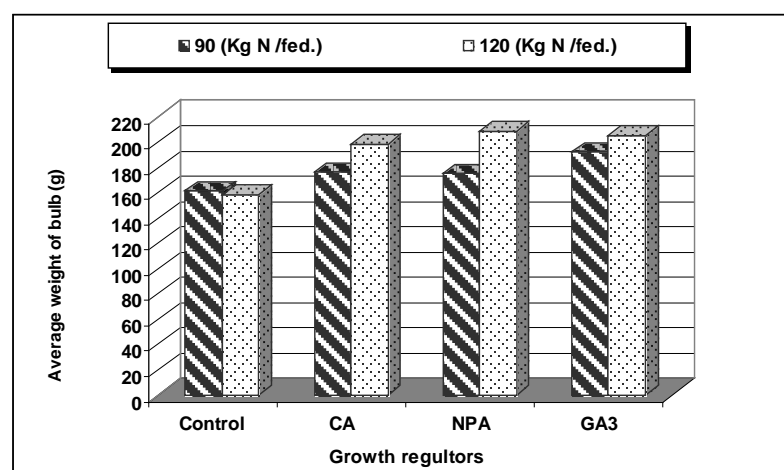
The presented data of Table (3) and Figs.(5, 6, 7& 8) clearly showed that foliar spraying of 3 growth regulators materials, i.e. citric acid (CA), naphthyacetic acid (NPA) and Gibberlic acid (GA) on foliage of onion plant caused an enhancement in total bulbs weight as tons/fed. and/or average bulb weight as well as the size and TSS values of onion bulb, if compared with the control treatment. Whereas, the presented data of Table (3) and Figs. (5, 6, 7& 8) also, indicated that foliar spraying by NPA and/or GA resulted the heaviest bulb yield as ton/fed. (18.503–19.282 in the first experiment and 18.937–19.412 in the second one). Also, average weight, size and TSS values of bulb were followed same pattern of change. It means that, the foliar spraying by either NPA or GA resulted in the highest bulbs yield and its components, where the statistical analysis of the collected data indicated that the differences within these two materials failed to reach the significance at 5% level. These findings are true in both experimental seasons.

Recently, Abdel-Aal Faten (2009) reported that, the heaviest yield of sweet pepper and the best values of its physical properties were associated with that plants which sprayed by GA₃, followed in decreasing order by naphthyacetic acid and lastly by citric acid. Moreover, the same author added that the organic acid treatments caused an improvement in the fruits yield and its physical properties if compared by the checked treatments. Many other investigators had results strongly supported that which written here (Bharat *et al.*, (1998); Fatma Rizk *et al.*, (2002); Akram and Hosni (2007); Shaheen *et al.* (2007); and Abdel-Aal Faten *et al.* (2010).

The interaction treatments between the two studied factors, i.e. nitrogen rates and growth regulators materials as affecting the bulbs yield and its constituents recorded no significant effect in the two seasons. It means, that each factor of the interaction act independently.

Table 3: Influence of nitrogen fertilization rates and foliar spraying of some growth regulators on yield and quality of onion plant under drip irrigation conditions in El-Nubaria region in seasons of 2005/2006 and 2006/2007.

Nitrogen rates (unit N /fed.)	Treatments Growth regulators	Yield (ton/ fed.)	Average weight of bulb	Bulb (cm)		T.S.S.	Yield (ton/ fed.)	Average weight of bulb	Bulb (cm)		T.S.S.
				Length	Diameter				Length	Diameter	
				2005/2006			2006/2007				
90	Control	15.517	144.29	7.46	6.28	11.58	16.014	161.53	6.17	6.56	11.85
	Citric acid	18.453	166.23	7.79	7.19	12.52	18.559	176.20	7.89	7.14	12.19
	Naphthylaeetic acid	18.610	168.91	7.89	7.40	13.08	17.953	175.27	8.32	7.70	12.70
	GA ₃	17.183	182.70	7.73	7.23	13.71	19.508	192.21	7.96	7.47	13.65
	Mean	17.441	165.53	7.72	7.03	12.72	18.009	176.30	7.58	7.22	12.72
120	Control	16.290	153.17	7.36	6.98	11.71	16.219	158.90	6.58	6.45	11.56
	Citric acid	18.610	187.24	8.74	7.64	12.39	19.266	198.72	8.86	7.56	13.54
	Naphthylaeetic acid	19.953	189.26	9.23	7.89	13.11	19.921	208.86	8.59	7.87	13.57
	GA ₃	19.823	192.80	8.63	7.50	12.94	19.316	205.25	8.54	7.51	14.19
	Mean	18.669	180.62	8.49	7.50	12.54	18.681	192.93	8.14	7.35	12.54
Average	Control	15.903	148.73	7.41	6.63	11.64	16.116	160.22	6.37	6.51	11.70
	Citric acid	18.532	176.74	8.27	7.42	12.46	18.913	187.46	8.38	7.35	12.86
	Naphthylaeetic acid	19.282	179.09	8.56	7.64	13.09	18.937	192.07	8.45	7.78	13.13
	GA ₃	18.503	187.75	8.18	7.37	13.32	19.412	198.73	8.25	7.49	13.92
	Nitrogen	0.144	0.79	0.31	0.14	0.12	0.315	3.05	0.43	0.13	0.17
L.S.D. at 5% level	Growth regulators	0.889	14.54	0.65	0.66	0.56	0.899	15.93	1.36	0.35	0.67
	Interactions	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

**Fig. 5:** Effect of nitrogen fertilization rates and foliar spraying of some growth regulators on average weight of bulb during season of 2005/2006.**Fig. 6:** Effect of nitrogen fertilization rates and foliar spraying of some growth regulators on average weight of bulb during season of 2006/2007.

CA = Citric acids – NPA = Naphthyacetic acids - GA = Gibberlic acids.

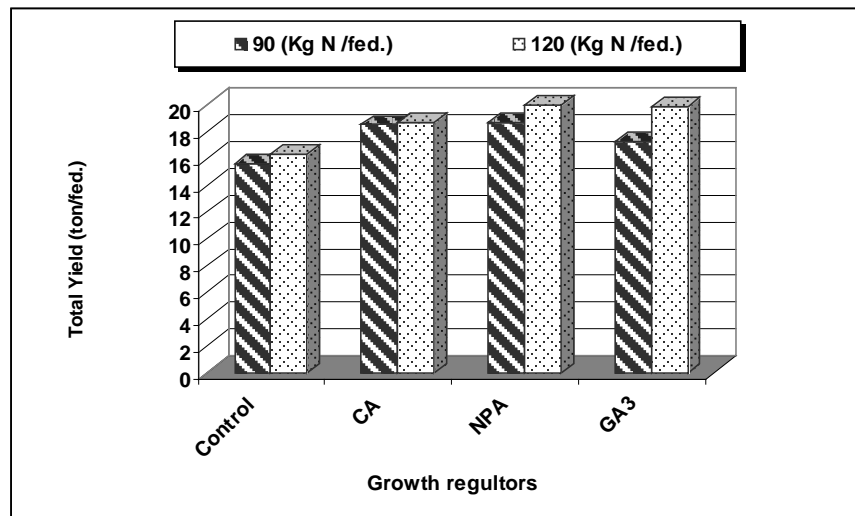


Fig. 7: Effect of nitrogen fertilization rates and foliar spraying of some growth regulators on total bulb yield during season of 2005/2006.

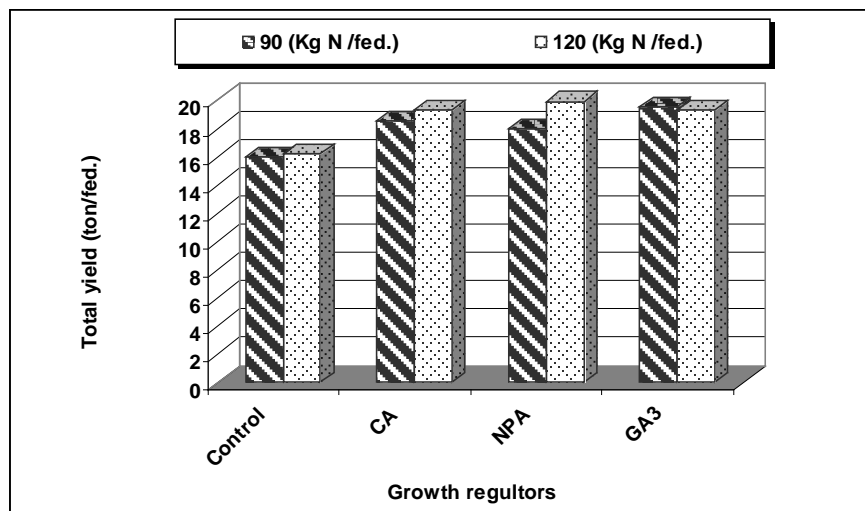


Fig. 8: Effect of nitrogen fertilization rates and foliar spraying of some growth regulators on total bulb yield during season of 2006/2007.

CA = Citric acids – NPA = Naphthyacetic acids - GA = Gibberlic acids

C- Nutritional Values of Onion bulbs:

Tables (4 and 5) showed the effect of different nitrogen addition rates and the foliar spraying of 3 some growth regulator materials plus checked treatment on the nutritional values (protein, N, P, K, Fe, Mn, Zn and Cu) during the two seasons of 2005/2006 and 2006/2007. Whereas, the highest values of the nutritional values were detected in onion tissues of those plants which received the higher N rate, i. e. 120 unit/fed. if compared with the application of lower N rate. These were true for all the previous nutritional element in both experiments.

Generally, the obtained results concerning the effect of nitrogen fertilizer on the nutritional values of vegetable fruits are in good accordance with Abdel-Moez *et al.*, (1997); Abd-allah (2001); Rizk Fatma (2001); Fatma Rizk *et al.*, (2002); Aisha *et al.*, (2007); Shaheen *et al.*, (2010) and Shahzad *et al.*, (2010).

Regarding, foliar spraying of plant growth regulator materials, the obtained data revealed that, the application of 3 materials gave an increment in nutritional values over the control treatment. Moreover, applied GA resulted in the highest values of protein, N, P, K, Fe, Mn, Zn and Cu. These results are similar the two

experimental seasons. However, the statistical analysis of the obtained data indicated that the differences within the growth regulators materials were great to be significant. Many authors, had the same trend which rerecorded herein such as Prasad and Prasad (1999); Shaheen *et al.*, (2007); Mona Abdel-Mouty and Nadia El-Greadly (2008); Abdel-Aal Faten (2009) and Ghonam *et al.*, (2010)).

The interaction within the two factors of treatments had no significant differences on the nutritional values during the two experimental seasons. It may be due to that each factor of the interaction act independently.

Table 4: Influence of nitrogen fertilization rates and foliar spraying of some growth regulators on chemical contents of onion plant under drip irrigation conditions in El-Nubaria region in season of 2005/2006.

Treatments		%				ppm			
Nitrogen rates (unit N /fed.)	Growth regulators	Protein	N	P	K	Fe	Mn	Zn	Cu
90	Control	8.67	1.39	0.36	3.48	267.33	64.00	43.67	20.33
	Citric acid	9.00	1.44	0.42	3.57	269.67	76.00	46.33	22.00
	Naphthylaeetic acid	9.52	1.52	0.46	3.65	273.67	83.33	45.67	25.67
	GA ₃	9.90	1.58	0.49	3.73	281.00	106.67	48.00	32.33
Mean		9.27	1.48	0.43	3.61	272.92	82.50	45.92	25.08
120	Control	8.81	1.41	0.35	3.63	253.33	67.67	40.67	21.33
	Citric acid	9.10	1.46	0.45	3.79	277.33	92.67	58.67	26.00
	Naphthylaeetic acid	10.19	1.63	0.52	4.38	286.00	109.33	60.33	27.67
	GA ₃	10.10	1.62	0.55	4.60	297.67	115.33	72.33	34.67
Mean		9.55	1.53	0.47	4.10	278.58	96.25	58.00	27.42
Average	Control	8.74	1.40	0.35	3.56	260.33	65.83	42.17	20.83
	Citric acid	9.05	1.45	0.44	3.68	273.50	84.33	52.50	24.00
	Naphthylaeetic acid	9.85	1.58	0.49	4.01	279.83	96.33	53.00	26.67
	GA ₃	10.00	1.60	0.52	4.16	289.33	111.00	60.17	33.50
L.S.D. at 5% level	Nitrogen	0.06	0.01	0.002	0.098	0.92	2.75	0.10	0.19
	Growth regulators	0.72	0.12	0.03	0.44	8.16	11.90	1.35	2.63
	Interactions	N.S.	N.S.	N.S.	N.S.	11.54	N.S.	1.92	N.S.

Table 5: Influence of nitrogen fertilization rates and foliar spraying of some growth regulators on chemical contents of onion plant under drip irrigation conditions in El-Nubaria region in season of 2006/2007.

Treatments		%				ppm			
Nitrogen rates (unit N /fed.)	Growth regulators	Protein	N	P	K	Fe	Mn	Zn	Cu
90	Control	9.25	1.48	0.35	3.51	253.00	76.67	48.33	20.67
	Citric acid	10.29	1.65	0.43	3.64	267.00	95.33	49.33	22.33
	Naphthylaeetic acid	11.08	1.77	0.46	3.67	281.00	110.00	51.33	24.33
	GA ₃	11.02	1.76	0.47	4.10	289.33	123.00	53.67	34.00
Mean		10.41	1.67	0.43	3.73	272.58	101.25	50.67	25.33
120	Control	9.60	1.54	0.39	3.46	253.67	86.33	46.67	21.67
	Citric acid	11.31	1.81	0.46	3.73	284.00	95.17	53.67	24.67
	Naphthylaeetic acid	11.13	1.78	0.45	3.82	290.67	112.67	65.33	26.00
	GA ₃	13.25	2.12	0.48	4.79	299.67	134.00	76.00	33.33
Mean		11.32	1.81	0.45	3.95	282.00	107.04	60.42	26.42
Average	Control	9.43	1.51	0.37	3.48	253.33	81.50	47.50	21.17
	Citric acid	10.80	1.73	0.44	3.69	275.50	95.25	51.50	23.50
	Naphthylaeetic acid	11.10	1.78	0.46	3.75	285.83	111.33	58.33	25.17
	GA ₃	12.14	1.94	0.48	4.45	294.50	128.50	64.83	33.67
L.S.D. at 5% level	Nitrogen	0.39	0.06	0.01	0.020	1.58	0.83	0.33	0.75
	Growth regulators	1.50	0.24	0.03	0.41	8.87	9.72	1.94	2.59
	Interactions	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	2.75	N.S.

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