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Sustaining the Quality and Quantity of Onion Productivity Throughout Complementrity Treatments Between Compost Tea and Amino Acids

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ABSTRACT

Field experiments were carried out at the National Research Centre experimental Farm to study the effect of applying compost tea extract at two levels, i.e. 100 and 200 L/fed., as well as the foliar spraying by Amino mix compound at levels of 1, 2 and 3 cm/L on onion plant growth parameters, bulb yield as total, marketable and/or un-marketable and some physical quality of onion bulb at harvesting times. The important obtained results could be summarized as following:

- The tallest onion plants which carried the outnumbers of leaves, the heaviest fresh and dry weight of leaves, neck and bulb, as well as total bulbs yield all of these measurements recorded their highest values when onion plant irrigated with compost tea extract at rate of 200 L/fed. In addition, the obtained results reveals that, the amount of total bulb yield increases which resulted when compost tea at rate 200 L/fed., was applied over the control plants amounted by 31.8 and 26.2 % respectively in 1st and 2nd season.
- In spite of the increase in un-marketable bulbs yield as ton/fed., due to the increasing total bulb yield, but the percentage of un-marketable and/or splitting bulbs recorded a depression values with using compost tea extracts, where the lowest percentage detected with using the high rate of compost tea.
- Compost tea supplying caused a slow effect on the physical bulbs yield quality, i.e. length and/or diameter of bulb or its neck, but the average bulb weight recorded a significant increase when compost tea used.
- Foliar spraying by amino mix compound caused on enhancement in onion plant growth characters, i.e. length of plant, leaves number, fresh and dry weight of whole plant and its organs. Also, total bulb yield and TSS value recorded their highest values when Amino mix sprayed at level within 2 – 3 cm/L. On the contrary the percentage of un-marketable and splitting bulbs decreased with using Amino mix, and the lowest values were when used the highest Amino mix level.
- The interaction between compost tea and Amino mix treatments had a little effect on plant growth and bulbs yield, where the differences were not enough to reach the 5 % level of significant.

***Key words**:* Onion, compost tea, amino acids, growth, total and un-marketable bulbs yield.

Introduction

Onion is one of the most important vegetable crops in Egypt. 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.

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 crops (El-Shabasi *et al*., 2005; Awad *et al*., 2007; Al-Said and Kamal, 2008; Faten *et al*., 2010).Amino acids are fundamental ingredients in the process of protein synthesis, formation of vegetable tissue and chlorophyll synthesis (Abo Sedra *et al*., 2010 and El-Desouky *et al*., 2011). Amino acids also function in the synthesis of other organic compounds, amines, purines and pyrimidine, alkaloids, vitamins, enzymes, terpenoids and others (Pratelli and Pilot, 2007).

Compost applications are a commonly used practice in agriculture; however the concept of compost tea is becoming increasingly popular in organic agriculture. Compost tea is simply a liquid solution form of compost that has been soaked in water. The solution produced from the soaking contains nutrient is known as compost tea. The concept of compost tea is relatively new and there are very few research reports documenting its effectiveness. Research has documented that compost teas suppress diseases in organic systems (Haggag and Saber, 2007; Hibar *et al*., 2006). Other benefits of compost tea are the stimulation of root and vegetative growth (Hibar *et al*., 2006). Compost teas have been also found to increase crop yields and produce quality (Haggag and Saber, 2007). More research is needed to validate the effect of compost teas on crop yields so that organic growers may have additional options when it comes to increasing crop yields.

In addition Zheljazkov and Warman, 2004 reported that compost used to improve soil physical and biological properties, i.e. water retention capacity, drainage, pH, better availability of soil micro-organism and

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reducing the negative impact of chemical based pesticides and fertilizers in ecosystems. Compost tea also produced plant hormones; mineralize plant available nutrients, fixes nitrogen and providing useful microorganisms that colonize leaf surface. Many investigations reported similar promotion effect for compost fertilizer on different plants (Edris *et al*., 2003).

Therefore, this study was conducted to elucidate the effect of injected compost tea extract within irrigation water and foliar spraying of Amino mixture compound on the growth, total bulbs yield and its components as well as its physical properties of onion plant.

Materials and Methods

Field experiments were done during the two successive seasons of 2011/2012 and 2012/2013 at the Experimental Agriculture Station of National Research Centre in Nobaria (120 km fair Cairo)to study the effect of irrigation onion plants with injunction compost tea at two levels, i.e. 100 and 200 L/fed., as well as the foliar spraying of amino mix. compound at 3 levels, i.e. 1, 2 and 3 cm/L., on the plant growth characters, bulb yield as total and/or marketable. It means, that the interaction treatments were 7 treatments which were the interaction between two compost tea rates and 3 levels of Amino mix plus control one (No treated plants). The soil texture of experiments was sandy with 95.3 % and 0.4 % silt and 4.3 % clay. The pH was 7.9 and E.C. was 2.0 ds/m. The experimental design was factorial where, the compost tea arranged in main plots, but the Amino mix distributed in 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).

Seedlings of onion cv. Giza 20 were planted on the 3*th* week of December in the two seasons of 2011 and 2012 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 sulphates (48 % K2O) at rate of 200 kgs/fed. were divided into two equal proportion and applied at 60 and 90 days after seedling. The nitrogen fertilizer at rate of 200 kg/fed., as nitrogen sulphate (20.6 %) were divided 3 parts and added 60, 75 and 90 days after transplanting. The different agricultural practices of onion plant, such as irrigation, weeds, disease and pest controls were applied according the advice of the Egyptian Agricultural Ministry.

A. Compost tea:

Compost tea extract was prepared by soaking each 25 kg from Nile compost (produced by the Egyptian Ecaru company)in 250 L water for 48 hours, then was squeezed, collected and used as compost tea according the method described by Nasef *et al*., (2009). Compost tea was applied as injected within irrigation water on soil at two rates 100 and/or 200 L/fed. The injection of compost tea applied 4 times, 60, 75, 90 and 105 days after transplanting. Table (1) shows the chemical properties of organic Nile compost and Nile compost tea.

Table 1: The chemical composition of compost and its compost tea.

	Nile compost	Nile compost tea
Density	650 kg/m^3	-
Moisture	27 %	-
EC ds/m (1:10)	3.6 %	0.8 %
Organic matter	42 %	-
Total nitrogen	1.9 %	195 ppm
Available phosphorus	0.71 %	13.5 ppm
Available potassium	0.56 %	175 ppm
Mg	251 ppm	113 ppm
Fe	915 ppm	61 ppm
Zn	88 ppm	5.31 ppm
Ca	118 ppm	66 ppm

B. Amino mix compound:

The chemical composition of Amino mix compound are shown in Table (2).

The following data were recorded:

A) Plant growth measurements:

Five onion plants of each sub-plot randomly taken after 125 days from transplanting date and transferred to the laboratory to recorded the following measurements:

1. Plant height (cm);
2. Number of leaves/plant;

3. Fresh weight of leaves, neck and/or bulb (g/plant).
4. Dry weight of leaves neck and/or bulb (g/plant).

Table 2: Shows the chemical composition of amino mix compound.

Nutritional elements g./100 cm.		Amino acids mg/100 cm		Vitamin mg/100 cm
Elements	Value			
Zn	2	Aspartic acid 249	Methionine 180	Vitamine B1 0.8
Fe	1.5	Threnine 45	Iso-Leucine 52	Vitamin B2 2.4
Mn	0.5	Serine 56	Tyrosine 38	Vitamin B6 1.2
Mg	0.004	Glutamic acid 55	Phenylalanine 22	Vitamin B12 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 B53.14
S	0.01	Valine 68	Tryptophan 20	Ascorbic acid 1.0
Co	0.03	Cysteine 44		

Source: Agrico international (www.agricointernational com).

B) Total bulb yield, and its components:

At harvesting time (150 days after transplanting) the following parameters were recorded:

1. Total bulb yield as ton/fed.
2. Percentage yield increase over control.
3. Un-marketable yield as ton/fed.
4. Percentage of un-marketable yield.
5. Percentage of splitting bulbs.
6. Total soluble solids (TSS).
7. The physical bulb properties, i.e., dimensions of bulb and neck as well as the average bulb weight as g/bulb.

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

Results and Discussion

A. Plant growth characters:

Data presented in Tables (3 and 4) show clearly that, irrigation onion plants with adding compost tea extract with water though irrigation system had a superiority in all plant growth parameter over the control treatment (without compost tea addition). Moreover, with increasing the rate of compost tea extract up to 200 L/fed., caused the highest vigor of plant growth. It could be concluded that, the tallest onion plants which carried the out numbers of leaves, the heaviest fresh and dry weight of leaves , neck and bulb, all of these measurements recorded their highest values when irrigated onion plants with compost tea at rate 200 L/fed. On the contrary, the poorest values were resulted with that plants no received no compost tea. These greatest values amounted by 18.6, 24.4, 27.4; 33.0 % respectively for plant length, average leaves number per plant, fresh weight and dry weight of whole plant in 1st experiment. However, these increments amounted by 3.8, 15.3, 34.6 and 27.4 % for the above respective in 2nd experiment. In other view, the statistical analysis of the obtained data detected that the differences with different compost tea treatments were great enough to reach the 5 % level of significant. These were true in both experiments with exception that of average leaves number and fresh weight of leaves in 1st season and plant length, average leaves number and dry weight of neck in 2nd season.

The beneficial effect of compost tea on plant growth characters of onion plant may be due to both supply nutrients and microbial functions (as useful microorganisms increase the time stomata stay open, then reducing less from the leaf surface). It can provide chelated microelements and make them easier for plants to absorb and increasing soil aeration and acidity (Edris *et al*., 2003; El-Sherbeny *et al*., 2007; Ebid *et al*., 2008 and Azza and Hendeawy, 2010). Recently Khaled *et al*., 2012. Reported that using compost tea at rate of 200 L/fed., resulted the vigor plant growth and heaviest yield of sesame crop, if compared with the application of organic and inorganic fertilizer as soil dressing.

Regarding to the effect of Amino mix compound, the recorded data reveals that, its all levels (1, 2 and 3 cm/L) caused an enhancement in plant growth parameters if compared with control treatment. Moreover, with increasing Amino mix levels up to 2 cm/L encouraged the plant to grow more and recorded the vigor onion plant growth compared with the lower and/or higher levels. These were clear in both two seasons, except plant height (1st season) and average bulb fresh weight (2nd season). It could be concluded that, application of Amino mix compound caused an increase in all plant growth criteria's over the control plants. Moreover, the foliar spraying of Amino mix at level of 2 cm/L had a great enhancement in plant growth of onion .The statistical analysis of the collected data reveals that, the differences within different Amino mix compound were significantly for all plant growth elements in both experiments, with exception of the plant length and average leaves number only in 2nd season.

Table 3: Effect of using compost tea as injection through irrigation water and foliar spraying of amino mix compound on onion plant growth characters during 2012 season.

Treatments		Plant length (cm)	No. of leaves / plant	Fresh weight (g)				Dry weight (g)			
Tea compost	Amino mix cm/L			Leaves	Neck	Bulb	Total	Leaves	Neck	Bulb	Total
Control		39.50	7.50	25.63	13.90	78.47	117.99	16.21	5.48	31.86	53.54
100 L. /fed.	1	45.33	7.67	32.38	16.51	97.49	146.38	15.80	8.57	37.49	61.87
	2	46.33	8.33	30.75	16.88	93.05	140.69	17.40	9.17	38.75	65.32
	3	45.67	11.67	28.63	16.25	91.74	136.62	16.07	7.47	39.76	63.29
Mean		43.67	8.67	29.07	15.77	88.45	133.29	16.11	7.51	36.63	60.26
200 L. /fed.	1	49.33	9.67	32.35	18.07	88.55	138.98	20.15	8.37	43.42	71.94
	2	44.33	9.00	36.53	18.90	112.15	167.59	18.95	9.34	46.62	74.91
	3	47.00	9.33	30.47	17.60	96.35	144.42	17.92	8.73	40.11	66.76
Mean		45.58	9.00	31.52	17.24	95.62	144.38	18.57	8.14	40.83	67.54
Averages	Control	39.50	7.50	25.63	13.90	78.47	117.99	16.21	5.48	31.86	53.54
	1	47.33	8.67	32.37	17.29	93.02	142.68	17.98	8.47	40.46	66.91
	2	45.33	8.67	33.64	17.89	102.60	154.14	18.18	9.25	42.69	70.12
	3	46.33	10.50	29.55	16.93	94.04	140.52	17.00	8.10	39.93	65.03
L.S.D. at 5 %	Tea compost	1.29	N.S.	N.S.	0.98	3.04	7.08	1.37	0.59	2.20	0.70
	Amino mix	2.58	1.13	3.18	0.88	4.60	4.30	1.31	0.72	1.12	2.08
	Interactions	N.S.	1.60	N.S.	N.S.	6.50	6.08	N.S.	N.S.	1.59	2.93

Table 4: Effect of using compost tea as injection through irrigation water and foliar spraying of amino mix compound on onion plant growth characters during 2013 season.

Treatments		Plant length (cm)	No. of leaves / plant	Fresh weight (g)				Dry weight (g)			
Tea compost	Amino mix cm/L			Leaves	Neck	Bulb	Total	Leaves	Neck	Bulb	Total
Control		49.00	8.67	26.82	12.07	71.35	110.23	14.71	7.16	34.80	56.67
100 L. /fed.	1	51.00	10.33	29.47	15.94	91.23	136.64	15.53	9.85	38.53	63.91
	2	53.67	7.33	30.20	18.75	95.71	144.66	16.47	10.02	43.82	70.31
	3	49.33	7.67	25.17	17.92	86.11	129.20	16.07	7.07	40.77	63.90
Mean		50.08	8.08	27.86	15.51	84.84	128.21	15.45	8.41	39.11	62.97
200 L. /fed.	1	53.00	10.00	32.69	18.45	98.36	149.50	18.57	8.78	41.85	69.20
	2	49.17	11.00	35.67	21.87	89.33	146.87	19.27	9.65	47.70	76.61
	3	50.37	9.00	33.60	18.39	96.82	148.81	18.58	8.95	43.20	70.73
Mean		51.05	10.08	32.25	18.35	90.23	140.83	18.02	8.75	42.26	69.03
Averages	Control	49.00	8.67	26.82	12.07	71.35	110.23	14.71	7.16	34.80	56.67
	1	52.00	10.17	31.08	17.19	94.80	143.07	17.05	9.31	40.19	66.56
	2	51.42	9.17	32.94	20.31	92.52	145.76	17.87	9.83	45.76	73.46
	3	49.85	8.33	29.38	18.16	91.46	139.01	17.33	8.01	41.98	67.32
L.S.D. at 5 %	Tea compost	N.S.	N.S.	2.82	1.83	3.56	7.31	1.45	N.S.	2.08	2.08
	Amino mix	N.S.	N.S.	2.73	1.36	7.65	8.52	1.01	1.27	2.54	2.73
	Interactions	N.S.	N.S.	3.86	1.92	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

It could be concluded that, the onion plants which treated with the amino mix 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 2). 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, it could be reported that the promotional effect of amino acids treatment might be due to its beneficial role in the process of protein synthesis, formation of vegetable tissue and chlorophyll synthesis, similar effect and findings about amino acids were indicated by Abo Sedra *et al*., 2010 on strawberry and El-Desouky *et al*., 2011 tomato. Amino acids are precursors or activators of phytohormones and growth substance (i.e., alternative routes of IAA synthesis exist in plants, all starting from Tryptophan (Marschner, 1995). The biosynthesis of cinamic acids (which are the starting materials for the synthesis of phenols) are derived from phenylalanine and tyrosine. Tyrosine is hydroxyl phenyl amino acid hat is used to build neurotransmitters and hormones). Amino acids also function in the synthesis of other organic compounds, amines, purines and pyrimidine's, alkaloids, vitamins, enzymes, terpenoids and other (Pratelli and Pilot, 2007).

Similar results were obtained by other investigators such Shaheen *et al*., 2010 on onion plant, and Faten *et al*., 2010 on squash plant. El-Tohamy and Greadly, 2007 on Snap bean, El-Desouky *et al*., 2011 on tomato. Moreover, Abd El-Aal, 2012 reported that spraying amino acids mixture at 4 ml/L 4 times with intervals of 10 days after the first one (25 days after Ananas melon sowing) caused a significant increase in stem length and diameter, number of formed branches and leaves/plant, fresh and dry weight of both stems and leaves, total leaf area/plant.

The interaction effect between the application of compost tea at rates of 100 and 200 L/fed., with the foliar spraying by Amino mix compound at 3 levels, i.e. 1, 2 and 3 cm/L. on plant growth of onion plant are presented

in Tables (3 and 4). It obviously that in spite the no significant response of most plant growth parameter of onion plant to the interaction treatment, but the obtained data showed that, applied compost tea by the higher rate (200 L/fed.) and foliar spraying of Amino mix at the medium level (2 cm/L) resulted vigor plant growth. Moreover, the statistical analysis of the obtained data detected that, there were no great variation enough to be significantly at 5% level. These were hold good in all plant growth measurements, with some little exception.

B. Total bulbs yield and its components:

Table (5) clearly demonstrated that, total bulb yield as tons/fed., un-marketable and splitting bulbs, greatly affected by the application of compost tea as organic fertilizer and Amino mix as a promotive foliar substance. Whereas, adding compost tea with irrigation water had an encourage in total bulbs yield if compared with the control treatment. Moreover, increasing the rate of compost tea up to 200 L/fed., resulted more increase in total bulbs yield compared with the addition of 100 L/fed. Shortly, the amount of bulb yield increases over the control one accounted by 31.56 and 39.8 % respectively with addition 100 and 200 L/fed., in 1st experiment. But these amounted by 22.7 and 26.02 % in 2nd experiment with the same above respective. The obtained results showed that, the using compost tea within the level of 100 – 200 L/fed. was most benefit for increasing the onion bulbs yield. In parallel , the um-marketable bulb yield as ton/fed., increased with increase the using compost tea level to record its highest weight with applied the highest compost tea level (200 L/fed.). On the contrary, the percentage of un-marketable bulbs yield recorded a decrease values with increasing the level of compost tea.

It means that, applying the higher level of compost tea for onion plant caused an increase in un-marketable bulbs weight, in spite this increment but the un-marketable bulbs yield as percentages recorded a decrease with increasing compost tea levels.

Table 5: Effect of using compost tea as injection through irrigation water and foliar spraying of amino mix compound on total onion bulbs yield and its components during of 2012 and 2013 seasons.

Treatments		First season						Second season					
Tea compost	Amino mix cm/L	Total bulb yield (ton / fed.)	% yield increase over control	Un-marketable yield (ton / fed.)	% Un-marketable yield (ton / fed.)	% Splitting bulbs	T.S.S. value	Total bulb yield (ton / fed.)	% yield increase over control	Un-marketable yield (ton / fed.)	% Un-marketable yield (ton / fed.)	% Splitting bulbs	T.S.S. value
Control		10.93	--	1.636	14.97	3.77	10.30	11.36	--	1.408	12.39	2.75	9.23
100 L. /fed.	1	12.95	18.48	1.757	13.57	3.71	10.75	13.78	21.30	1.793	13.01	2.11	9.51
	2	15.97	46.11	2.026	12.68	3.35	11.33	13.10	15.32	1.526	11.65	1.95	9.65
	3	14.23	30.19	1.651	11.60	3.05	11.36	14.95	14.12	1.577	10.55	1.81	9.71
Mean		14.37	31.59	1.811	12.59	3.37	11.15	13.94	16.91	1.516	11.74	1.95	9.62
200 L. /fed.	1	13.80	26.26	1.751	12.69	3.31	11.01	12.85	13.11	1.646	12.81	2.31	10.05
	2	16.10	47.30	1.933	12.00	3.16	11.29	14.46	27.30	2.374	11.42	2.14	10.26
	3	15.96	45.93	1.740	10.90	3.11	12.11	15.64	37.67	2.482	10.87	2.01	11.08
Mean		15.28	39.83	1.810	11.84	3.19	11.47	14.32	26.03	1.746	11.70	2.02	10.46
Averages	Control	10.93	--	1.636	14.97	3.77	10.30	11.36	--	1.408	12.39	2.75	9.23
	1	13.38	22.40	1.540	13.13	3.51	10.80	13.31	17.16	1.719	12.91	2.21	9.78
	2	16.04	46.75	1.979	12.34	3.26	11.31	13.78	21.30	1.300	11.53	2.04	9.95
	3	15.10	38.15	1.695	11.25	3.08	11.73	14.37	26.50	2.029	10.71	1.91	10.39
L.S.D. at 5 %	Tea compost	1.33	--	0.370	--	--	N.S.	0.751	--	0.116	--	--	N.S.
	Amino mix	1.09	--	N.S.	--	--	N.S.	1.15	--	N.S.	--	--	N.S.
	Interactions	2.35	--	N.S.	--	--	N.S.	1.66	--	N.S.	--	--	N.S.

The splitting bulbs as percentages followed the same pattern of change like un-marketable bulbs yield as percentages. Lastly, the values of total soluble solids (TSS) recorded an increase with increasing the compost tea level, but the variation within different treatments fasted to reach the 5% level of significant during the two experiments.

It could be concluded that, adding compost tea with irrigation water resulted in an increase in total bulbs yield, and caused a depression in the percentages of un-marketable and splitting bulbs. These hold good in the two experimental seasons. Moreover, the statistical analysis of he obtained data reveals that differences within different compost tea levels were great to be significantly in both two seasons.

The superior of onion yield and its components which obtained when treated plant soils by compost tea at higher rate might be attributed to its role in improve soil physical and biological properties, i.e. water retention drainage, pH, better availability of soil micro-organism and reducing the negative impact of chemical based pesticides and fertilizers in ecosystems (Zheljazkov and Worman, 2004). Moreover, researches has documented by Haggag and Saber, 2007 and Hiber *et al*, 2006 showed that, compost tea suppress diseases in organic, systems and they added that the other benefits of compost tea are the stimulation of root, vegetative growth and yield of plants. Other investigators such as Edris *et al*., 2003 had the same direction which supports the obtained results.

The obtained results reveals that, compost tea caused a decrease in the percentages of the un-marketable bulbs yield, it might be due to the physic-chemical properties of the compost tea namely nutrients and organic molecules such as humic or phenolic compounds (Scheuerell and Mahafee, 2007 and Siddrqui *et al*., 2008), and

may protect the plant against disease through improved nutritional status, direct toxicity towards the pathogen or induced systemic resistance.

Concerning to effect of application of Amino mix compound as foliar spraying at levels of 1, 2 and 3 cm/L., during the two seasons of 2011/2012 and 2012/2013 are shown in Table (5). It detected that, foliar spraying of Amino mix resulted the heaviest tonnage bulbs yield if compared to un-treated plants. These were true in both seasons. However, the most benefits levels of Amino mix was when used at 2 cm/L, where, the highest bulbs yield as ton/fed., the highest percentage yield increase value over the control plants as well as the heaviest un-marketable yield as ton/fed., all of these parameters recorded in first season. During the second season, the above mentioned characters recorded their peaks only when Amino mix compound was sprayed at 3 cm/L. On the contrary, percentages of un-marketable yield and/or splitting bulbs, recorded their highest values with un-treated plants.

It could be concluded that, using amino mix, at level within 2 – 3 cm/L increased the total bulbs, but decreased the percentages of un-marketable and splitting bulbs. The total soluble solids values followed the same pattern of change like to total bulbs yield. These findings held well in both two experimental seasons. Moreover, the statistical analysis of the obtained data reveals that the differences within various levels of amino mix compound were great enough to reach the 5 % level of significant during the two experiments.

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 amino mix 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 (Table 2) which stimulate and enhancement the metabolism processes in plant tissues.

Similar trend was obtained by El-Shabasi *et al*., 2005; Awad *et al*., 2007 and Al-Said and Kamal, 2008, whereas, their studies reported that amino acids caused a promotion effected directly or indirectly the physiological activities in building the essential substances such as carbohydrates and protein which reflected on total plant yield and its components.

Recently, Faten *et al*., 2010 and Shaheen *et al*., 2010 reported that, foliar spraying by amino mixture compound 3 times with 15 days intervals resulted the heaviest total yield as tons/fed., as well as the best measurements of physical quality of fruits.

The interaction treatments between rates of compost tea and amino mix as affect total bulbs yield and its components during the two seasons of 2011/2012 and 2012/2013 are shown in Table (5). It clear detected that in spite the no significant effect on most parameters presented in Table (5), but as general, it could be concluded that, adding compost tea at higher rate, i.e. 200 L/fed., and foliar spraying amino mix at levels within 2 – 3 cm/L caused an enhancement in total bulbs yield and TSS values, but caused a depression effect on un-marketable and splitting bulbs. These findings were similar completely in both seasons. In addition, the statistical analysis of the obtained data reveals that, the differences within interaction treatments were significantly only for total bulbs yield, but not other measurements.

C. Some physical properties of onion bulbs yield:

The response of onion bulb and neck dimension as well as average bulb weight as gram to the interaction treatments of compost tea rates and amino mix levels during the two seasons of 2011/2012 and 2012/2013 are presented in Table (6). As a general, adding compost extract with irrigation system had an increase in length and diameter of bulb and its neck as well as weight of bulb. In spite the no-significance effect of compost tea treatment on most onion bulb measurements, but it could concluded the increase value over the control treatment amounted by 14.1, 23.2, 23.0, 34.8 and 15.8 % in 1st season respectively for length, diameter of neck, and length and diameter of bulb as well as average bulb weight. But these superior in second season for the same above mentioned respective amounted by 12.4, 10.4, 6.1, 12.0 and 19.3 %. Generally, it could be reported that, the superiority of the bulb neck dimensions as well as average bulb weight which recorded when compost tea applied might be attributed to its roles for producing plant hormones and providing useful microorganisms that colonize leaf surface, mineralize plant available nutrients and fixes nitrogen which reflecting on the physical yield properties (Edris *et al*., 2003 and Ebid *et al*., 2008).

Foliar spraying of amino mix compound caused an increase in length and diameter of onion bulb, but decrease, the length and diameter of bulb neck. These results were more clear in the obtained data of 1st season, but fluctuated slowly in 2nd season. Generally, it could summarized that, the heaviest bulb weight detected with using amino mix at level within 2 – 3 cm/L.

It could be concluded that, foliar spraying by Amino mix had a little effect on the dimension of onion bulb and its neck.

The interaction treatments between compost tea rates and Amino mix levels had no significant effect on dimension of onion bulb and/or its neck. This might be attributed to the individual effect for each factor or due to the independently action of the interaction treatments.

The interaction treatments caused a significant effect on the average bulb weight in both experiments. However, the heaviest bulb weight recorded when adding compost tea at higher rate, i.e. 200 L/fed., and with foliar spraying of Amino mix at highest level, i.e. 3 cm/L. These were true in both seasons of 2011/2012 and 2012/2013.

Table 6: Effect of using compost tea as injection through irrigation water and foliar spraying of amino mix compound on some physical properties of onion yield during of 2012 and 2013 seasons.

Treatments		First season					Second season				
		Neck (cm)		Bulb (cm)		Averages wt. of bulb (g)	Neck (cm)		Bulb (cm)		Averages wt. of bulb (g)
Tea compost	Amino mix cm/L	Length	Diameter	Length	Diameter		Length	Diameter	Length	Diameter	
Control		7.87	1.55	5.30	5.25	118.92	7.72	1.82	5.88	6.00	123.68
100 L. /fed.	1	10.17	1.83	5.37	5.47	127.42	8.47	2.03	6.10	6.63	140.17
	2	9.00	1.27	5.67	6.23	129.07	8.43	1.60	6.10	6.07	133.67
	3	10.00	1.60	6.27	6.73	124.87	9.13	1.77	6.43	7.27	136.67
Mean		9.38	1.53	5.63	5.90	124.65	8.32	1.74	6.13	6.47	133.35
200 L. /fed.	1	11.17	2.00	5.93	6.27	130.47	6.27	1.97	6.10	6.67	145.24
	2	7.27	2.23	6.10	7.57	146.38	7.67	2.23	6.63	7.00	150.22
	3	8.50	1.50	7.53	7.40	136.43	6.90	1.83	6.00	6.50	147.33
Mean		8.58	1.85	6.24	6.64	133.48	7.26	2.03	6.15	6.57	141.81
Averages	Control	7.87	1.55	5.30	5.25	118.92	7.72	1.82	5.88	6.00	123.68
	1	10.67	1.92	5.65	5.87	128.95	7.37	2.00	6.10	6.65	142.70
	2	8.13	1.75	5.88	6.90	137.73	8.05	1.92	6.37	6.53	141.95
	3	9.25	1.55	6.90	7.07	130.65	8.02	1.80	6.22	6.88	142.00
L.S.D. at 5 %	Tea compost	N.S.	N.S.	0.58	0.41	0.62	1.06	N.S.	N.S.	N.S.	1.17
	Amino mix	0.78	N.S.	0.40	0.34	4.45	N.S.	N.S.	N.S.	N.S.	4.62
	Interactions	N.S.	N.S.	N.S.	N.S.	6.30	N.S.	N.S.	N.S.	N.S.	6.53

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