ALLEVIATE THE HARMFUL EFFECTS OF SALINE RECLAIMED SOIL CONDITIONS ON GROWTH AND PRODUCTIVITY OF ONION PLANTS USING ASCORBIC ACID AND ORGANIC FERTILIZER

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ABSTRACT

A filed trial was conducted during the two successive seasons of 2007/2008 and 2008/2009 in the Experimental Farm at Demo (reclaimed soil with salinity at 7.84 and 8.01 dSm^{-1} in the two seasons, respectively), Faculty of Agriculture, Fayoum University to investigate the influence of farmyard manure soil application at the rates of 0, 10, 20 and $30m^3$ $fed.^{-1}$, ascorbic acid foliar application at the rates of 0, 100, 200, 300 and $400mgl^{-1}$ and their combinations on the possibility of improving growth, yield of onion (*Allium cepa* L.) plants under the above mentioned conditions. In comparison with zero rate of farmyard manure, all other rates significantly increased vegetative growth characters (i. e. plant height, No. of leaves $plant^{-1}$, leaves fresh weight $plant^{-1}$, raw bulb fresh weight $plant^{-1}$, total fresh weight $plant^{-1}$, leaves dry weight $plant^{-1}$, bulb dry weight $plant^{-1}$ and total dry weight $plant^{-1}$), total yield and some chemical constituents under study (i.e. total chlorophyll, total carotenoids, N, P and K of leaves and/or bulbs). The same results were obtained with all ascorbic acid rates; 100, 200, 300 and $400mgl^{-1}$ as compared to the zero rate. Economically, ascorbic acid treatment at the rate of $300mgl^{-1}$ combined with soil fertilization treatment at the rate of $20m^3$ $fed.^{-1}$ proved to be the best and may counteracted the inhibitory effects of salinity on onion plants.

In view of above mentioned results, it has been concluded that spraying onion plant (cv. Giza 6), producing with the soil fertilized by the farmyard manure at the rate of $20m^3$ $fed.^{-1}$, with ascorbic acid at the rate of $300mgl^{-1}$ could be counteracted the adverse conditions particularly, salinity up to 5000ppm and consequently, economic yield is obtainable.

Key Words: Onion (*Allium cepa* L.), farmyard manure, ascorbic acid, salinity, vegetative growth, yield, Chemical composition.

INTRODUCTION

In Egypt, onion (*Allium cepa* L.) is considered one of the most important vegetable crops growing for local consumption and exportation.

A general reduction in growth and yield due to salinity is widely documented (**El-Saidi, 1997**). The drastic influence of salinity on plant growth and metabolism was attributed, principally, to the enhanced Na^+ uptake which causes ion excess in plant tissues **(Greenway and Munns, 1980 and Abbas *et al.*, 1991)**. One of the primary effects of increasing salinity in the growth medium is the inhibition of K^+, Ca^{2+} and NO_3^- uptake by plant roots **(Mass, 1986).** In addition, It is well established that salinity strees damages plant cells through production of reactive oxygen species including superoxide, hydrogen peroxide, hydroxyl anions and singlet oxygen **(Scandalios, 1997)**. On the other hand, some trials have been made to alleviate the disturbances in plant metabolism excreted by salinity stress. It has been suggested that some antioxidants (to which belongs ascorbic acid) may help to overcome some of these inhibitory effects. Ascorbic acid is an important antioxidant defense in pant cells **(Foyer and Halliwell, 1976)** to protect them by scavenging the reactive oxygen species. It also stimulates respiration activities, cell division and many enzymes activities (**Reda *et al.*, 1977; Innocenti *et al.*, 1990 and Rautenkranz *et al.*, 1994**).

Latterly, there are widespread use of natural and safety substances such as antioxidants particularly, ascorbic acid for enhancing growth and productivity of many crops. Since ascorbic acid has synergistic effect on growth, flowering, yield and chemical composition under favourable and unfavourable environmental conditions i.e. salinity **(Ali; 2002** on tomato plants and **Rady; 2006** on sunflowers plants**)**

Several recent studies have indicated that addition of organic manure, as a natural or synthetic organic materials, to salinity reclaimed soil is necessary due to their unique ability to improve the chemical, hydrophysical and biological characteristics of soils or growing media. However, their buffering effect helps maintaining an uniform reaction in soil media, beside it can hold up to 20 times its weight in water. This is important particularly for salinity reclaimed soils to improve soil moisture conditions, especially during summer seasons. In this respect, **Abo-El-Defan (1990)** in his study under saline condition found that addition of organic manure increased fresh and dry yields of tomato shoots, fruits and the concentration of N, P and K in both shoots and fruits.

Organic matter may affect plant growth as a source of growth promoters, auxins, vitamins, amino acids which act on the vegetative growth, yield and quality of the plant product **(Melo and De- Oliveira, 1999).**

El-Foly (2004) said that the organic manure fertilizers are very important means for providing the plants with their nutritional requirements without having undesirable impact on the environment. For many years, organic fertilizers have been used basically as a mean of alleviation of the problem of chemical residues in the export market commodities**.**

Accordingly, the present work was planned for studying the effect of different rates of farmyard manure and exogenous application of ascorbic acid on growth parameters, yield and some chemical constituents of onion plants cv. Cleopatra grown under saline reclaimed soils during both 2007/2008 and 2008/2009 seasons.

MATERIALS AND METHODS

A field experiment was conducted using onion (cv. Giza 6) during two successive seasons of 2007/2008 and 2008/2009 in the Experimental Farm at Demo (reclaimed soil with salinity at 7.84 and 8.01 dSm^{-1} in the two seasons, respectively), Faculty of Agriculture, Fayoum University, Egypt. Prior to the initiation of each season, soil samples to 25cm depth from the experimental site were taken and analyzed according to the published procedures of **Wilde *et al*., (1985)** and the results are given in Table (1). Imported onion seeds cv. Giza 6 were sown in the nursery on 20^{th} September, 2007 and 23^{th} September, 2008 seasons. Fifty days after seed sowing, each seedling was transplanted into a plant bed in the field. The used experimental design was a split plot in a randomized complete blocks with four replications. Farmyard manure rates were allocated in the main plots and ascorbic acid rates were assigned randomly to sub-plots. Each experimental unit; 20 m^2 area consisted of 8 rows; 5 m long and 50 cm width, within row spacing averaged 10 cm apart.

The treatments comprised different farmyard manure rates (0 "as control", 10, 20 and 30m^3 fed.$^{-1}$) were broadcasted and incorporated during the soil preparation. The main chemical characteristics and nutrients status of the applied farmyard manure are presented in Table (2).

Table (1): Physical and chemical characteristics of the experimental site during the seasons of 2007/2008 and 2008/2009.

Property	2007/2008	2008/2009
Physical:		
Clay %	28.30	27.50
Silt %	20.60	21.10
Fine sand %	51.10	51.40
Soil texture	Sandy clay loam	Sandy clay loam
Chemical:		
pH (1:2.5)	7.81	7.78
ECe (ds m^{-1})	7.81	8.01
Organic matter (%)	1.26	1.21
Ca CO_3 (%)	8.48	8.61
N (%)	0.08	0.07
Available elements(mg kg^{-1} soil):		
K	70.07	65.88
P	16.29	14.96
Zn	0.61	0.56
Fe	5.25	5.03
Mn	4.11	3.78

Table (2): The main chemical analysis and nutrients of the applied farmyard manure.

Character	Value		Character	Value	
	2007/ 2008	2008/ 2009		2007/ 2008	2008/ 2009
Weight of 1 m^3 (kg)	800	823	C/N ratio	22.02	21.22
pH (1:10 water suspension)	7.41	7.33	Total P %	0.64	0.58
EC (dS/m, 1:10 water extract)	4.1	3.8	Total K %	1.11	1.08
Moisture content %	13.2	19.1	Available Fe (mg kg^{-1})	783	775
Organic matter %	48.8	43.7	Available Mn (mg kg^{-1})	133	117
Organic carbon %	28.4	26.1	Available Zn (mg kg^{-1})	108	93
Total N %	1.29	1.23	Available Cu (mg kg^{-1})	35	31

In addition to all different farmyard manure rates, recommended mineral fertilizers (200kg N + 72kg K_2O + 31kg P_2O_5 fed.$^{-1}$) were added. Nitrogen (Ammonium nitrate 33.5% N) was applied in 4 equal applications; one of them was spread on the rows before transplanting directly and the rest of the amount was added at 30, 50 and 70 days from transplanting. Potassium sulphate (48% K_2O) was used side banded at two equal doses; 50 and 70 days from transplanting. Phosphorus fertilizer, in the form of calcium superphosphate (15.5% P_2O_5) was broadcasted and incorporated during soil preparation. Other agricultural practices were applied as recommended for commercial onion production.

The plants were received the foliar application of ascorbic acid at 0, 100, 200, 300 and 400 mgl^{-1}to run off, three times; 30, 45 and 60 days after transplanting. Few drops of Tween-20 were added to the spraying solution as a surfactant.

At maturity stage; 8th and 11rd of April 2008 and 2009, respectively, a random ten plants were collected from the four outer rows from each treatment to estimate the following parameters: plant height (cm), No. of leaves plant^{-1}, fresh and dry weights of leaves plant^{-1} (g), raw fresh bulb weight (g), dry weight of bulb (g), total fresh and dry weights of bulbs plant^{-1} (g) were recorded. Also, whole plants were collected from four inner rows from each experimental plot and weighed then used for estimating the total yield (ton fed.$^{-1}$). Fresh samples of leaves and bulbs from ten plants were dried after their collection randomly from each plot in an electric oven at 70^{o}C for 72h to determine dry weight then, ground and kept for chemical analysis.

Chemical analysis: leaf pigments; ninety days after transplanting, a random sample of fresh mature leaves of four plants was collected for determining leaf pigments; total chlorophyll and total carotenoids contents (mg g^{-1}) were extracted by acetone 80% then, determined using colorimetric method (**Welburn and Lichtenthaler, 1984**). At harvesting stage, in dried leaves and bulbs, nitrogen (% dry matter) was colorimetrically determined using the Orange-G dye (**Hafez and Mikkelsen, 1981**). Phosphorus (% dry matter) was colorimetrically determined using chlorostannous molybdophosporic blue colour method in sulphuric acid system (**Jackson, 1967**). Potassium (% dry matter) was determined using a Perkin-Elmer Flame Photometer **(Page *et al.*, 1982)**.

Statistical analysis:

All data were subjected to statistical analysis according to (**Snedecor and Cochran, 1980)**. Comparisons of the means were carried out using the least significant difference (LSD) at p = 0.05 level.

RESULTS AND DISCUSSION

I- Growth characters:

As for farmyard manure; main treatments, data in **Tables (3 - 5)** show a significant gradual increase in all growth characters under study with increasing farmyard manure rate as compared to the control treatment. The differences among 0, 10 and 20m^3 fed.$^{-1}$ were significant. On the other hand, the difference between the two rates 20 and 30m^3 fed.$^{-1}$ was insignificant. Economically, the best farmyard manure rate was 20m^3 fed.$^{-1}$ which surpassed the control by 8.6, 16.1, 18.2, 14.1, 16.2, 9.5, 11.7 and 10.9% in the first season whereas in the second one surpassed the control by 8.9, 16.8, 19.6, 15.5, 16.9, 10.8, 14.3 and 13.0% for plant height, No. of leaves plant^{-1}, leaves fresh weight plant^{-1}, raw bulb fresh weight plant^{-1}, total plant fresh weight, leaves dry weight plant^{-1}, bulb dry weight plant^{-1} and total dry weight plant^{-1} as compared to control treatment; 0 m^3 fed.$^{-1}$ farmyard manure. These enhancing results may be attributed to the improvement in leaf pigments **(Table, 6)** and nutritional status **(Tables, 7 and 8)** which positively reflected on total onion yield **(Table, 6)**.

Table 3

Table 4

Table 5

The increase in growth characters with the addition of farmyard manure might be due to the improvement of structure of the soil by increasing the soil water holding capacity which positively reflected on the soil aeration and drainage that encourage the root growth and nutrient absorption. **Saleh *et al.* (2003)** on onion revealed also that organic manure enhanced the availability of certain elements and their supply to the plant during growth period. However, organic manure increased the presence of P, K and Mg in the soil besides the solubility of Ca, Mg and NO_3 as a result of the lowering in pH induced by manure application and the increase in electrical conductivity.

Yung-Yu Shu (2006) studied the effects of applied different kinds of organic composts on some plant characteristics as compared to those treated with the mineral fertilizers alone, and reported that at the most active vegetative growth stages of the plants, the amount of nutrients absorbed from the chemical fertilizers were found to be higher than those treated with organic manure. Whereas, the values of the studied plant parameters and nutrient uptake by plants with the organic manure treatment were the highest at the maturity stage. The later case confirmed by the plants of the next crop, however, the values of the same plant parameters at the organic manure treatment were also recorded the highest among all treatments at maturity stages. It could be interpreted such phenomena on the fact that the chemical fertilizer was a fast-release fertilizer used to supply nutrients at the early stages of growth of the first crop, while the beneficial effect of the composts on plant growth and nutrient uptake was conspicuous in the next crop as compared with that of routine treatment of chemical fertilizer. These results are in accordance with those reported with **Ali *et al.* (2001), Salman *et al.* (2002) and Rizk-Fatma (2002).**

Regarding ascorbic acid foliar application; sub-main treatment, data illustrated in **Tables (3–5)** reveal that, as ascorbic acid rate increased up to 300mg l^{-1} vegetative growth traits under study were gradually increased in significant amounts. The rate of 400mg l^{-1} ascorbic acid scored an insignificant difference in favor of it as compared with the rate of 300mg l^{-1}. Economically, the concentration of ascorbic acid at 300mg l^{-1} considers as the favourable treatment which recorded the following increments over the control treatment (0mg l^{-1} ascorbic acid): 12.3, 51.5, 40.5, 31.3, 35.4, 31.5, 22.0 and 25.2% in the first season. Furthermore, the increments in the second season were as follows: 12.7, 39.7, 41.3, 32.7, 35.5, 31.2, 21.4 and 24.8% for plant height, No. of leaves plant^{-1}, leaves fresh weight plant^{-1}, raw bulb fresh weight plant^{-1}, total plant fresh weight, leaves dry weight plant^{-1}, bulb dry weight plant^{-1} and total dry weight plant^{-1}, respectively.

Increased endogenous concentration of ascorbic acid leads to protect plant cells and consequently, protect the photosynthetic apparatus by scavenging reactive oxygen species **(Zhang and Schmidt, 2000)** thus, vigorous plant growth will be obtained under stress conditions. In this connection, **Elade (1992)** stated a positive action for antioxidants especially, ascorbic acid on growth and attributed this finding to their effects on counteracting drought, salinity and diseases stresses and protecting plant cells against free radicals that responsible for plant senescence as well as to their auxinic action and consequently, enhancing growth characters. In addition, ascorbic acid might be regulates cell wall expansion, division and elongation through its action on cell vacuolarization **(Gonzalez-Reyes *et al.*, 1994; Navas and Gomez-Diaz, 1995 and Cordoba-Pedregosa *et al.*, 1996),** improves the nutritional status and absorbing phenolic compounds which lead to save the growing tissues from toxic effects of the oxidized phenols **(Gupta *et al.*, 1980)** and / or enhances the biosynthesis of carbohydrates **(Ahmed, 2001)** and translocation of sugars **(Farag, 1996**) which could be explain the present results. These findings are in coincidence with those obtained by **Rady (2006) and El-Yazal (2007)**.

Economically, application of farmyard manure at the rate of $20m^3$ $fed.^{-1}$ combined with foliar application with ascorbic acid at 300mg l^{-1} concentration proved to be the best combined treatment among all combined treatments since surpassed the combined control; zero rate ascorbic acid under zero m3 $fed.^{-1}$ farmyard manure by 20.0, 76.2, 65.0, 48.1, 54.3, 44.7, 34.7 and 38.1% in the first season and 25.0, 61.1, 66.9, 49.0, 56.1, 46.1, 33.8 and 38.1% in the second season for plant height, No. of leaves $plant^{-1}$, leaves fresh weight $plant^{-1}$, raw bulb fresh weight $plant^{-1}$, total plant fresh weight, leaves dry weight $plant^{-1}$, bulb dry weight $plant^{-1}$ and total dry weight $plant^{-1}$, respectively. This distinctive results in relation to vegetative traits under above mentioned best combined control may be attributed to the distinctive results of leaf pigments **(Table, 6)** and nutritional status of plants **(Tables, 7 and 8)** under the same combined treatment.

II- **Total yield**:

It has been showed from data in **Table (6)** that, all rates of farmyard manure application exhibited significant differences in total yield as compared to the control; zero rate and among of them except for the difference between the highest two rates; 20 and $30m^3$ $fed.^{-1}$ which granted an insignificant difference between them. Thus, the best treatment which economically operative is $20m^3$ $fed.^{-1}$ farmyard manure application which yielded increases above the control averaged at 19.1, and 20.2% in the first season and the second one, respectively. These distinguished results in total yield may be attributed to the distinctive results obtained for vegetative traits **(Table, 3-5)**, leaf photosynthetic pigments **(Table 6)** and nutritional status of plants **(Tables, 7 and 8)**.

The positive effect of farmyard fertilizers on yield may be due to increasing the availability of macro and micronutrients in rooting zone and resulting from soil pH reduction by applying organic manure, which could improve physical and chemical properties of the soil. In this respects **Negm *et al*. (2003)** found that the added organic manure reduced soil pH value and increased the available content of each N, P and K in soil. They also showed that the curve of increase reached its highest value during harvest stage of the grown plants and gradually tended to reduce again.

Singer *et al.* (2007) reported that organic manure amendment increased P and K uptake by plant roots. Organic manure amendment decreased soil pH with the increase in the soil organic matter which reflected on more availability for nutrients in favour of plants and consequently positively reflected on total yield. This trend is in a good accordance with results which outlined by many investigators; **Ali *et al.* (2001), Salman *et al.* (2002) and Rizk-Fatma (2002).**

As for the influence of ascorbic acid foliar application on total onion yield which illustrated in **Table (6)**, data reveal that there was a gradual increase by significant amounts with increasing the concentration of ascorbic acid used gradually form 0 to 300mg l^{-1}. The concentration of 400mg l^{-1} ascorbic acid haven't a significant increment above the treatment of 300mg l^{-1}. The latter considered as the best treatment which recorded increases surpassed the control;

zero mg l^{-1} ascorbic acid recorded at 29.8 and 28.9% for 2007/2008 and 2008/2009 seasons, respectively.

Regarding the distinctive results obtained from the same best treatment of vegetative characters **(Tables, 3-5)**, leaf photosynthetic pigments **(Table, 6)** and the nutritional status of plants **(Tables, 7 and 8)**, my proved to be the explanation in favour of total onion yield.

In this respect; **Al-Qubaie (2002)** stated that ascorbic acid as an antioxidant has an auxinic action, synergistic effect on the biosyntheses of carbohydrate and controlling the incidence of most fungi on plants which making them in vigorous states and reflects on yields. Furthermore, **Shalaby (2006)** reported an increase in yield bulbs of onion plant as a result of the foliar application with some antioxidants. Their results regarding the beneficial effect of ascorbic acid on yield are confirmed with those reported by **Rady (2006) and El-Yazal (2007).**

The interactions between the application of farmyard manure and ascorbic acid and their effects on total onion yield are presented in **Table (6)**. The treatment of 20m^3 fed^{-1} farmyard manure combined with foliar application at the rate of 300mg l^{-1} proved, in this study, to be the best. This treatment gave the increases averaged at 50.5 and 50.3% for the first and second seasons, respectively as compared with the combined control; zero m^3 fed.$^{-1}$ farmyard manure and zero mg l^{-1} ascorbic acid.

The combined treatment of farmyard manure and ascorbic acid at the rates of 20m^3 fed.$^{-1}$ and 300mgl^{-1}, respectively proved to be the best, and exhibited the most pronounced counteracted effect on soil salinity under study.

III- Chemical constituents:

Data in **Tables (6-8)** reveal that content of total chlorophyll and total carotenoids, in plant leaves as well as concentration of N, P and K in plant leaves and bulbs were significantly increased as farmyard manure increased till 20m^3 fed.$^{-1}$ then, slightly increased in both two seasons of study. Thus, the treatment of 20m^3 fed^{-1} farmyard manure is considered as the best among all farmyard manure treatments. This treatment recorded increments in the order of 33.0 and 30.2% as well as 37.3 and 31.3% for total chlorophyll and total carotenoids in both two seasons, respectively. Furthermore, the best treatment was scored 8.2, 14.3, 6.0, 8.7, 17.4 and 9.9% in the first season, whereas the second one collected 9.4, 14.9, 7.0, 10.0, 18.1 and 10.4% under the same treatment for leaf N, leaf P, leaf k, bulb N, blub P and bulb K, respectively. These pronounced increments may be due to the best status of leaf photosynthetic pigments consequently more photosynthates producing more energy for more absorption of mentioned elements and others thus the best nutritional status reflecting on the vigority of vegetative traits and yield under study.

Regarding the influence of ascorbic acids on leaf photosynthetic pigments as well as N, P and K concentration of leaves and bulbs, data shown in **Tables (6–8)** exhibit that all these parameters were gradually increased by significant quantities as a result of foliar application with ascorbic acid up to 300mgl^{-1} then neglictably increased. The proportion of 48.1, 64.9, 21.4, 22.6, 13.6, 10.5, 24.3 and 46.9% in the first season as well as the proportion of 47.0, 63.9, 21.0, 22.2, 13.2, 10.0, 23.5 and 45.4% in the second season for leaf chlorophyll, leaf carotenoids, leaf N, leaf P, Leaf K, bulb N, bulb p and bulb k, respectively were the increments of the best treatment economically; spraying plant foliage with ascorbic acid at the rate of 300mgl^{-1} as compared with the treatment free from ascorbic acid (tap water). The promotive effect of ascorbic acid on chlorophyll and carotenoids and the other components under study might be attributed to the enhancing effects of this antioxidant on the nutritional status of onion plants since, N is one of the essential chlorophyll components and consequently more biosynthesis of photosynthates in the face cell elongation.

As regard to the results of the combination between all farmyard manure treatments and different rates of ascorbic acid, data exhibited in **Tables (6–8)** reveal that the combination between 20m^3 fed.$^{-1}$ farmyard manure treatment and spraying plant foliage with ascorbic acid at 300mgl^{-1} economically preferable to all other combinations since granted the following increases : 102.8, 120.0, 30.6, 37.7, 19.8, 19.3, 40.5 and 59.7% in the first season while, in the second one granted the following increments : 100.5, 117.0, 33.0, 39.2, 19.8, 20.0, 41.5 and 60.6% for leaf chlorophyll, leaf carotenoids, leaf N, leaf P, Leaf K, bulb N, bulb P and bulb K, respectively as compared to the combined treatment of zero rate farmyard manure and zero rate ascorbic acid.

The beneficial effect of farmyard manure and ascorbic acid on overcoming soil salinity which reflected on improving vegetative growth traits **(Tables, 3, 4 and 5)** and yield **(Table, 6)**, surely reflected also on stimulating the nutritional status of plants.

Ali *et al.* (2001), Rizk-Fatma (2002) and Mohamed and El-Ganaini (2003) They attributed such results to the effect of organic fertilizers in improving soil physical and biological properties as well as chemical characteristic resulting in more release of available nutrient elements to be absorbed by plant roots and the water use efficiency by different plants, which was positively reflected on the biosynthesis processes, particularly, the pigments and carbohydrates.

The promotive effect of ascorbic acid on photosynthetic pigments and chemical constituents might be attributed to the enhancing effect of this antioxidant on the nutritional status of onion plant **(Tables, 6-8)** since, nitrogen is one of essential chlorophyll components. Besides, the presence of iron and manganese is necessary for biosynthesis of chlorophylls **(Rady, 2006)**. The role of ascorbic acid as an antioxidant, which directly involved in the regulation and protection of photosynthetic processes **(Farago and Brunold, 1994)** could be led to enhancing the effect of ascorbic acid on photosynthetic pigments under study. This may be explained by the findings of **Foyer *et al.* (1990)** who stated that, the antioxidant prevented enzyme inactivation, the generation of more dangerous radicals and allowed flexibility in the production of photosynthetic assimilatory power. Moreover, electron transfer to O_2 prevented over reduction of electron transported chain, which reduced the risk of harmful back reactions within the photosystem. In addition, **Elade (1992) and Farag (1996)** proved that most antioxidants were responsible for accelerating the biosynthesis of various pigments. The positive effect of ascorbic acid on photosynthetic pigments obtained by **Ali (2002), Rady (2006) and El-Yazal (2007)** were in agreement with findings of the present study.

Increasing chemical constituents concentrations of plants leaves producing from organic fertilizer fecundated-soil might be due to the increase in plant capacity to absorb nutrients, which increased the roots surface per soil volume unit; **Negm *et al.* (2003)** showed that the added organic manure reduced soil pH value, increased soil organic matter and increased the available content of N, P

Table 6

Table 7

Table 8

and K in the soil. These results are in agreement with reported by **Ali *et al.* (2001), Rizk-Fatma (2002) Mohamed and El-Ganaini (2003), Saleh *et al.* (2003).**

The obtained results were also supported by the results of **Ahmed and Abd El-Hameed (2004)** who reported that the effect of antioxidants on producing healthy plants leads to enhancing the plants to have a great ability for uptake of elements. Moreover, **Gonzalez-Reyes *et al.* (1994)** concluded that ascorbate free radical caused hyperpolarization of plasma membranes, and this energization could then facilitate transport processes across such membranes. Most of the previous results are consistent with those of **Ali (2002), Rady (2006) and El-Yazal (2007).**

CONCLUSION

Within the experimental conditions studied, it has been concluded that this work gave an evidence to the role of farmyard manure especially at the rate of $20m^3$ $fed.^{-1}$ by which the soil pH can be reduced consequently more solubility and availability of nutrients for the absorption by plant roots besides, enriching the soil with organic matter. Moreover, the role of ascorbic acid, as an antioxidant by which plant foliage sprayed especially at the concentration $300mgl^{-1}$, in inducing salinity tolerance of onion plants cv. Giza 6 cultivated in salt-affected reclaimed soils containing salts concentration at about 500ppm leading to favourable growth and consequently obtain economic yield under such conditions.

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تقليل التأثيرات الضارة للأراضى المستصلحة الملحية على نمو ومحصول نباتات البصل باستخدام حمض الأسكوربيك والسماد العضوى

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أجريت تجربة حقلية خلال موسمى ٢٠٠٨/٢٠٠٧ و ٢٠٠٩/٢٠٠٨ م فى مزرعة كلية الزراعة - جامعة الفيوم بمنطقة دمو (أرض مستصلحة تحتوى على ملوحة قدرت عند ٧,٨٤ و ٨,٠١ ديسى سمنس / م لموسمى النمو على الترتيب)، وذلك لدراسة تأثير الإضافة الأرضية للسماد العضوى (مخلفات الماشية) بمعدلات صفر (الكنترول)، ١٠، ٢٠ و ٣٠م^{٣}/فدان، والرش الورقى بحامض الأسكوربيك بمعدلات صفر (كنترول)، ١٠٠، ٢٠٠، ٣٠٠ و ٤٠٠ ملجم/لتر ماء وتفاعلاتها معًا على احتمالية تحسين النمو، والمحصول والمكونات الكيماوية لنباتات البصل.

بالمقارنة بالمعدل صفرم^{٣}/فدان سماد عضوى، وجد أن جميع المعدلات الأخرى قد أدت إلى زيادة معنوية فى كل من صفات النمو الخضرى (ارتفاع النبات، عدد الأوراق / نبات، الوزن الطازج للأوراق/ نبات، الوزن الطازج للبصلة/نبات، الوزن الطازج الكلى للنبات، الوزن الجاف للأوراق / نبات، والوزن الجاف للبصلة/ نبات والوزن الجاف الكلى/نبات) والمحصول الكلى وبعض المكونات الكيماوية المختبرة (الكلوروفيل الكلى، الكاروتينويدات الكلية، النيتروجين والفوسفور والبوتاسيوم للأوراق و/ أو الأبصال). وتم الحصول على نفس النتائج مع معدلات حامض الأسكوربيك المستخدم بالمقارنة بالمعدلات صفر.

ومن الناحية الاقتصادية وجد أن الرش بحامض الأسكوربيك بمعدل ٣٠٠ ملجم/لتر مع إضافة السماد العضوى للتربة بمعدل ٢٠م^{٣} / فدان هى المعاملة الأفضل وادت إلى خفض التأثيرات المثبطة للأملاح على نباتات البصل.

وفى ضوء النتائج السابقة، يمكن استنتاج أن الرش بحمض الأسكوربيك بمعدل ٣٠٠ملجم / لتر على المجموع الخضرى لنباتات البصل (صنف جيزة ٦) النامية فى تربة تم تخصيبها بالسماد العضوى (سماد ماشية) بمعدل ٢٠م^{٣} / فدان، يعمل على الحد من الظروف المعاكسة فى التربة، خاصة الملوحة حتى التركيز ٥٠٠٠ جزء فى المليون، وبالتالى إمكانية الحصول على محصول اقتصادى من البصل تحت هذه الظروف.