Zagazig J. Agric. Res., Vol. 41 No. (3) 2014 451-465

Zagazig Journal of Agricultural Research

http:/www.journals.zu.edu.eg/journalDisplay.aspx?Journalld=1&queryType=Master

EFFECT OF DRIP IRRIGATION AND COMPOST RATES ON THE PRODUCTIVITY AND ANATOMICAL CHARACTERS OF AUBERGINE (*Solanum melongena* L.) GROWN UNDER SANDY SOIL CONDITIONS

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ABSTRACT

This experiment was carried out during the two successive summer seasons of 2012 and 2013 at the Experimental Farm of El-Kassasin Horticultural Research Station, Ismailia Governorate, Egypt, to study the effect of drip irrigation rates (1008, 2016 and 3024 m^3/fad.) and compost rates (5, 7.5 and 10 tons/fad.) as well as their interactions on growth, yield and anatomical features of aubergine (*Solanum melongena* L.) hybrid Taska F1 under sandy soil conditions. The results showed that vegetative growth, yield and its components, mineral contents and microscopical counts and measurements of certain histological characters of leaf blade tissues were significantly increased with increasing drip irrigation rates from 1008 to 3024 m^3/faddan. While, the lowest rate of drip irrigation (1008 m^3/fad.) caused inhibitory of most studied characters. In addition, vegetative growth, yield and its components, mineral contents and microscopical counts and measurements of certain histological characters of leaf blade tissues were significantly affected by compost rates, and the best rate to give the highest values was 10 tons/fad. In general, irrigation of aubergine plants with 3024 m^3/fad., combined with 10 tons compost/fad., improved vegetative growth, yield and its components, mineral contents and microscopical counts and measurements of certain histological characters of leaf blade tissues as compared to other interaction treatments.

Key words: Aubergine, drip irrigation rates, compost, growth, yield, anatomical structure.

INTRODUCTION

Aubergine (*Solanum melongena* L. belongs to family Solanaceae) is one of the most common vegetable crops grown in Egypt and its fruits are used as a staple food and desert.

The world is facing serious shortages of fresh water and growing competition for clear water, makes less water available for agriculture. The great challenge for the coming decades will be the task of increasing food production with less water, particularly in countries with limited water and land resources. Serious water shortages are developing in the arid and semi arid regions, as existing water resources are fully exploited (Jafar *et al.,* 2007). To cope with the increasing of food requirements and as drought is a major stress which adversely affects plant growth and productivity (Tawfik, 2008). Water resource management and water availability are among the most important political, social and economical issues of 21[st] century in Egypt (Medany *et al.,* 1997). Increasing demand for fresh water supply with growing demand for foods, there is a need to evaluate soil, water and crop as altered by compost and irrigation. Therefore, efforts of researchers, farmers and governments must be intensified and come together to save water by reducing irrigation water amount, increasing water use efficiency and determine the optimal coupling combinations between irrigation frequency and rate. This would be affect water

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application efficiency, increase yield per unit area, irrigation cost and labors requirement (Zwart and Bastiaanssen, 2004).

Some investigators dealt with the effect of drip irrigation rates found that, vegetative growth, yield and its constituents and mineral contents in plants increased with increasing irrigation levels (Anwar, 2005; Onder *et al.*, 2005; Youssef, 2007; Abou El-khair *et al.*, 2011; Kandil *et al.*, 2011; Khalil *et al.*, 2012; Eid *et al.*, 2013). On the other hands, at all stages of growth, exposing plants to water stress inhibited growth which reflected on yield and its quality (Yuan *et al.* 2003; Abou El-Khair, 2004 and Wang *et al.*, 2007). In the same trend, enhancement of anatomical parameters of leaf blade by increasing drip irrigation rates were reported by Mohamed *et al.* (2001) on roselle plant, Anwar (2005) on potato plant, Saad El-Deen (2006) on sesame plant and Desoky *et al.* (2013) on wheat plant. On the other hands, the anatomical parameters of leaf blade were reduced under water deficit conditions. Ahmed (1990); Mohamed (1996) and Mohamed *et al.* (2001) reported that water deficit triggers a change in hormonal balance, including an increase in leaf ABA (abscisic acid) and/or a decline in cytokinins. The increase in leaf ABA reduces cell wall extensibility and therefore causes a decline in cell elongation. Jia *et al.* (2001) suggested that the initiation of water deficit induced ABA accumulation was in fact brought about by weight loss of the leaf tissues as reflected by changes of cellular volume, rather than by water parameters.

It is well know that, sandy soil is infertile and has very small amounts of micro-elements and high soil pH. Addition of organic matter can improve all soil properties such as water holding capacity, soil aggregation, aggregation stability, soil fertility, and increase cation exchange capacity. Also, organic fertilizers were used to decrease soil pH and increase the availability of major and minor nutrients (Tahoun *et al.*, 2000; Nelson *et al.*, 2009). Over the last few decades, consumers demand for healthier food and governments policies focused on environmentally sustainable agricultural systems have both promoted a rapid expansion of organic farming (Van Diepeningen *et al.*, 2006). The organic matter content of the Egyptian soil is usually less than 2% in cultivated area. Frequent and high applications of organic manure are necessary to maintain soil fertility (Abdel -Moez *et al.*, 1999).

Application of organic manure to soils has several benefits and agriculturists by increasing soil acidity, organic matter, available elements and this in turn may increase vegetative growth, yield and its constituents and mineral contents in plants which increased with increasing organic rates (Makaraviciute, 2003; El-Zohery, 2004; Nour, 2004; Atia and Bardisi, 2005; Mohsen, 2006; Alam *et al.*, 2007; Hammad *et al.*, 2008; Shazly, 2008; Ali and Ali, 2013).

Fertilization of aubergine plants with compost improved leaf blade parameters, which increased with increasing compost rates (Ramadan *et al.*, 2003; Abou-Bakr *et al.*, 2005; Hassan *et al.*, 2006; Tartoura, 2010).

Therefore, this study aimed to evaluate the responses of growth, both yield quantity and quality and anatomical characters of aubergine plants grown under sandy soil conditions to drip irrigation rates and compost rates.

MATERIALS AND METHODS

This experiment was carried out during the two successive summer seasons of 2012 and 2013 at the Experimental Farm of El-Kassasin Horticultural Research Station (30°, 11 N, 31°, 18 E), Ismailia Governorate, Egypt, to study the effect of drip irrigation rates and compost rates as well as their interactions on growth, yield and its quality and anatomical characters of aubergine (*Solanum melongena* L.) hybrid Taska F1 under sandy soil conditions. The soil of the Experimental field was sandy in texture, Physical and chemical characters of the soil under study were conducted according to (Page *et al.*, 1982; Klute, 1986) are shown in Table 1.

Seeds were sown in nursery on 20th January in foam trays and the seedlings were transplanted (with 3-4 true leaves about 40 days) on 1st and 3rd March in both seasons, respectively, the distance between seedling was 30 cm.

Table 1. Physical and chemical analyses of the experimental soil

(a) Physical

Particle size distribution (%)				Textural class	Ca CO_3 (%)	O.M (%)
Coarse	Fine	Silt	Clay			
5.38	78.53	10.08	6.01	Sandy	1.20	0.80

(b) Chemical

pH*	EC* (dS/m)	SP	Ion concentration in paste extract (mmolc/l)						Available** (mg/kg)		
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO^{-3}	SO^{-4}	N	P	K
8.1	0.83	27	3.90	2.70	1.85	0.55	0.00	3.15	58.60	9.50	190.51

Samples of the soil were obtained from 25 cm soil surface. * pH in paste, and EC in paste extract.
** N: K_2SO_4 extract, P: Na-bicarbonate extract, K: NH_4OAc extract.

This experiment included nine treatments, which were the combinations between three drip irrigation rates and three compost rates as follows:

Drip Irrigation Rates

1. 1008 m^3/fad.
2. 2016 m^3/fad.
3. 3024 m^3/fad.

Compost Rates

1. 5 tons/fad.
2. 7.5 tons/fad.
3. 10 tons/fad.

Prior the irrigation treatments in all experimental units received equal amounts of water (50 m^3/fad.) in two week. The irrigation treatments were added in the morning at three times/week up to the end of July. Thus number of irrigations season were 54 times. The amounts of water were added using water counter and pressure counter at 1 bar. The amounts of calculated water were added to different treatments, expressed through drippers (4 l/hr.) to give such amounts of water which presented in Schedule 1.

The experimental unit area was 9 m^2 (3 x 3 m) and each unit contained four dripper lines with 3 m length for each, with 75 cm width. Moreover, the distance between emitters was 30 cm, thus each experimental unit contained 40 emitters. One line was used to measure the morphological and physiological traits and the other three lines were used for yield determinations. In addition, one row was left between each two experimental units as guard area to avoid the overlapping infiltration of irrigation water.

Compost rates; *i.e.,* 5, 7.5 and 10 tons/fad., were applied during soil preparation at about 20 – 25 cm depth in the center of planting rows and covered by sand.

The chemical properties of the organic sources are shown in Table 2.

These treatments were arranged in a split plot design with three replicates. Drip irrigation rates were randomly arranged in the main plots and compost rates were randomly distributed in the sub plots. All other agricultural practices of cultivation were performed as recommended by normal practices.

Data Recorded

Samples of ten plants from each experimental unit were randomly taken at 70 days after sowing and the following data were recorded.

Plant growth parameters

1. Plant height (cm)
2. Number of branches/plant
3. Number of leaves/plant
4. Dry weight; Arial plant organs (leaves and branches) were oven dried at 70^{0}C till constant weight, and the dry weight of whole plant (g) was calculated.

Schedule 1. Amounts of water, time needed to give such amounts and amounts of water supply at every irrigation

Treatments (m^3/fad.)	Time needs (min)	Water supply every irrigation (m^3/fad.)
1008	15	18.66
2016	30	37.33
3024	45	56.00

Table 2. The chemical properties of organic sources during 2012 and 2013 seasons

Season / Chemical properties	OM (%)	Total N (%)	Total P (%)	Total K (%)	Available Zn (ppm)	Available Mn (ppm)	Available Fe (ppm)
2012	25	0.8	0.4	0.8	30	88	100
2013	30	1.2	0.6	1.4	40	120	120

Yield and its components

Mature fruits were continuously harvested when reached suitable maturity stages. The following data were recorded:

1. $\text{Number of fruits/plant} = \frac{\text{Total number of fruits/plot}}{\text{Number of plants/plot}}$

2. Fruit weight (g)

3. $\text{Fruit yield/plant (g)} = \frac{\text{Total weight of fruits/plot}}{\text{Number of plants/plot}}$

4. Fruit yield/fed.: Total fruit yield (tons/fad.) was calculated on the base of total yield along harvesting stages by summing (the sum of all harvests).

Chemical Contents

Total nitrogen, phosphorus and potassium were determined in dry weight of plant according to AOAC (2002), and NPK uptake were calculated as NPK contents on dry weight basis (kg/fad.). Crude protein was calculated based on total N concentration according to AOAC (2002).

Anatomical Structure

For anatomical studies, specimens of selected treatments of aubergine at the age of 60 days (at the beginning of blooming stage) from sowing during the second season of 2013 were taken from the middle part of the 4^{th} internode and its leaf from the apex of the main stem for examination. These specimens (1 cm long) were killed and fixed for 24 hours at least in plant fixative which is known as FAA (formalin acetic alcohol) represented by the following formula: 50 ml ethyl alcohol (95%), 5ml glacial acetic acid, 10 ml formaldehyde (37- 40%), 35 ml distilled water. Then the specimens were washed and dehydrated in ascending concentrations of ethyl alcohol series, then cleared in transferring concentrations of xylene and absolute alcohol. Specimens were embedded in pure paraffin wax of melting point 52-54^{0}C. Sections were prepared using EPMA a rotary microtome at 14 microns. Paraffin ribbons were mounted on slides and sections were stained in safranin and light green. Sections were mounted in Canada balsam. (Nassar and El-Sahhar, 1998). Selected sections were examined to detect histological manifestations of the chosen treatments using light microscope (Olympus) with digital camera (Canon power shot S80) connected to computer; the photographs were taken by Zoom Browser Ex Program. The dimensions of sections were measured by using Corel Draw program ver.11.

Statistical Analysis

Data were tested by analysis of variance according to Snedecor and Cochran (1990) and the means separations were compared by using Least Significant Difference (LSD) at level 5%.

RESULTS AND DISCUSSION

Vegetative Growth

The obtained data in Table 3 revealed significant increase in all growth characters of aubergine as the rates of irrigation increased. Plant height, number of leaves/plant, number of branches/plant and dry weight of whole plant were significantly increased with increasing drip irrigation rates from 1008 to 3024 m^3/fad., Marschner (1998) stated that under sufficient water conditions, there were decrease in Abscisic acid and increase in Cytokinins (CYT), Gibberllic acid (GA) and Indole butyric acid (IBA) reflecting good growth and dry matter content. On the other hand, exposing aubergine plants to water stress (1008 m^3/fad.) caused significant decrease in all vegetative growth parameters compared with other treatments, this may be due to water stress affects carbohydrates metabolism, reduction in the uptake of nutritional elements, protein synthesis and the activities of many enzymes that may reflect a change in the balance between rates of synthesis and degradation leading to decrease in plant growth and dry matter accumulation and that verified by Abe and Nakai (1999) which reported that the decrease in soil moisture content may increase the internal water deficit of the plant and would probably decreased all internal plant processes; *i.e.,* stomatal opening rate, photosynthesis and cell enlargement as well as cell division. These results are in harmony with those reported by Anwar (2005); Onder *et al.* (2005) and Youssef (2007).

Also, the results in Table 3 show that plant height, number of both leaves and branches/ plant and dry weight of whole plant were significantly increased with increasing compost rates from 5 to 10 tons/fad. The stimulative effect after increasing compost rates on growth might be attributed to that compost improved physical, chemical and biological properties of sandy soil; *i.e.,* increasing soil organic matter, soil acidity due to formation of CO_2 and other organic acids, cation exchange capacity, water holding capacity, availability of water and major and minor nutrients and this in turn could be increased plant growth parameters (Tahoun *et al.* 2000; El-Shafie and El-Shikha, 2003; Nelson *et al.* 2009). These results are in agreement with those reported by Makaraviciute (2003); El-Zohery (2004); Nour (2004) and Atia and Bardisi (2005).

It is obvious from the same data in Table 3 that the interaction between drip irrigation rates and compost rates had a significant effect on plant height, number of both leaves and branches/ plant and dry weight of whole plant in two growing seasons. The most effective interaction treatment was between drip irrigation at rate of 3024 m^3/fad., and compost at rate of 10 tons/fad., which recorded the highest values. Furthermore, plants which exposed to the lowest rates of irrigation and compost gave minimum values of growth. Data also show that, irrigation plants by medium rate with the highest compost rate recorded values near to the values which recorded by maximum rates of irrigation and compost of them, with no significant difference in most cases. This may be attributed to the beneficial effect of compost.

Yield and Its Constituents

Concerning the effect of drip irrigation rates on number of fruits/plant, fruit weight, fruit yield/plant and fruit yield/fad., of aubergine are shown in Table 4. It is obvious that yield and its constituents were progressively and constantly increased with increasing drip irrigation rates, and the high rate (3024 m^3/fad.) gave the highest values. This may be due to the higher water quantity applied (3024 m^3/fad.) to plants led to keep higher water content in the plant tissues and this in turn, produced higher yield than those under water stress. These results are in good line with those obtained from the data of vegetative growth in Table 3. The present results were conflicted with those of Kandil *et al.* (2011); Khalil *et al.* (2012) and Eid *et al.* (2013).

Concerning with the effect of compost rates, it is quite clear from data in Table 4 that fertilization of aubergine plants with compost had a significant effect on yield and its constituents, which increased with increasing compost rate from 5 to 10 tons/faddan. Fertilization plants with 10 tons/fad., gave the highest values of number of fruits/plant, fruit weight, fruit yield/plant and fruit yield/fad., as compared to other rates. The increments of plant growth and yield may be due to that the application of compost to sandy soil can result in improving their physo-chemical and biological

Table 3. Effect of drip irrigation rates (m^3/fad.), compost rates (ton/fad.) and their interactions on vegetative growth of aubergine during 2012 and 2013 seasons

Characters		Plant height (cm)		No of branches/plant		No of leaves/plant		D.W of whole plant (g)	
Season		1st	2nd	1st	2nd	1st	2nd	1st	2nd
					Drip irrigation rates (m^3/fad.)				
1008		58.33	66.33	2.67	3.00	13.44	15.67	178.00	196.00
2016		64.89	71.22	4.44	5.00	17.33	22.00	224.89	237.00
3024		70.44	79.44	5.11	5.67	19.33	23.78	233.22	248.44
$LSD_{0.05}$		1.38	2.47	0.59	0.44	1.40	1.01	5.66	7.76
					Compost rates (ton/fad.)				
5		59.70	68.00	3.56	4.00	14.89	18.22	204.33	218.67
7.5		65.33	72.33	4.11	4.56	16.67	20.78	212.78	228.00
10		68.67	76.67	4.56	5.11	18.56	22.44	219.00	234.78
$LSD_{0.05}$		1.73	1.79	0.50	0.59	0.99	0.96	4.27	5.09
					Drip irrigation rates × Compost rates				
	5	53.00	62.67	2.00	2.33	12.00	14.00	171.33	187.67
1008	7.5	59.67	66.33	2.67	3.00	13.00	15.33	177.33	196.33
	10	62.33	70.00	3.33	3.67	15.33	17.67	185.33	204.00
	5	61.00	68.33	4.00	4.33	15.33	18.33	214.33	224.00
2016	7.5	63.67	70.67	4.33	5.00	17.00	23.00	226.00	241.33
	10	70.00	74.67	5.00	5.67	19.67	24.67	234.33	245.67
	5	65.00	73.00	4.67	5.33	17.33	22.33	227.33	244.33
3024	7.5	72.67	80.00	5.33	5.67	20.00	24.00	235.00	246.33
	10	73.67	85.33	5.33	6.00	20.67	25.00	237.33	254.67
$LSD_{0.05}$		3.00	3.11	0.87	1.03	1.71	1.66	7.89	8.33

Table 4. Effect of drip irrigation rates (m^3/fad.), compost rates (ton/fad.) and their interactions on yield and its constituents of aubergine during 2012 and 2013seasons

Characters		No of fruits/plant		Fruit weight (g)		Fruit yield/plant (kg)		Fruit yield/fad. (tons)	
Season		1st	2nd	1st	2nd	1st	2nd	1st	2nd
					Drip irrigation rates (m^3/fad.)				
1008		6.00	6.89	153.11	159.11	0.922	1.099	12.903	15.381
2016		8.22	9.67	163.33	170.00	1.345	1.640	18.836	22.965
3024		10.44	11.44	167.33	165.00	1.744	1.886	24.411	26.402
$LSD_{0.05}$		1.02	0.97	3.21	3.76	0.061	0.083	0.350	0.420
					Compost rates (ton/fad.)				
5		7.56	8.56	157.33	164.44	1.203	1.418	16.836	19.846
7.5		8.33	9.56	161.78	162.89	1.356	1.559	18.979	21.821
10		8.78	9.80	164.67	166.78	1.453	1.649	20.336	23.081
$LSD_{0.05}$		0.50	0.34	2.96	3.00	0.033	0.065	0.431	0.345
					Drip irrigation rates × Compost rates				
	5	5.00	6.00	148.00	154.33	0.740	0.926	10.360	12.964
1008	7.5	6.33	7.00	155.00	159.00	0.982	1.113	13.748	15.577
	10	6.67	7.67	156.33	164.00	1.043	1.257	14.602	17.603
	5	7.67	8.67	158.67	171.33	1.216	1.486	17.029	20.799
2016	7.5	8.33	10.00	162.67	167.33	1.357	1.671	19.003	23.389
	10	8.67	10.33	168.67	171.33	1.463	1.765	20.477	24.705
	5	10.00	11.00	165.33	167.67	1.651	1.841	23.119	25.774
3024	7.5	10.33	11.67	167.67	162.33	1.728	1.893	24.187	26.497
	10	11.00	11.67	169.00	165.00	1.852	1.924	25.928	26.936
$LSD_{0.05}$		1.07	0.99	4.67	3.99	0.078	0.095	0.763	0.673

properties. Moreover, increasing the morphological characters may be due to that application of compost manure to sandy soil increased soil organic matter which may increase the action of exchange capacity, available mineral nutrients as well as high content of nitrogen and this, in turn, stimulates plant growth, which reflected on yield. Organic matters also encouraged rhizosphere bacteria to enhance plant growth directly by production of phytohormones IAA, CYT and GA as reported by Frankenberger and Arshad (1995). Similar results were obtained by Alam *et al.* (2007); Hammad *et al.* (2008); Shazly (2008) and Ali and Ali (2013).

As for the interaction between drip irrigation rates and compost rates, it is evident from data presented in Table 4 that all interaction treatments had a significant effect on yield and its constituents. In general, irrigation plants with 3024 m^3/fad., and fertilization with 10 tons compost/fad., recorded the maximum values of number of fruits/plant, fruit weight, fruit yield/ plant and fruit yield/fad., as compared to other interaction treatments. On the other hand, the interaction between the lowest irrigation and compost rates, recorded the minimum values.

NPK Content and Uptake and Protein Content

The effect of drip irrigation rates on NPK content and uptake and crude protein content are shown in Tables 5 and 6. Plant analysis revealed that NPK content and uptake and crude protein content gradually increased with increasing water supply to the soil. This may be due to that increasing of water quantity applied to the soil increased the moisture content that make minerals more available to the plant, furthermore, irrigation plants with low drip irrigation rate (1008 m^3/fad.) caused a significant decrease in NPK content and uptake and crude protein content. Such reductions in the contents of these elements in different tissues were attributed primarily to soil water deficiency which markedly reduces the flow rates of elements in soil, their absorption by stressed root cells and also its ability to translocation through the different organs and tissues. This situation resulted in an interruption in the various metabolic pathways carried out by plant respiration, photosynthesis, biosynthesis of phospholipids, nucleic acids, plastids, enzymes., etc. disorders in both plasma membrane permeability and stomatal osmotic regulations, thus plants seized growth and eventually died (Saxena and Nautiyal, 2001). Also, the decrease in protein content under low soil moisture level may be due to that water stress causes a reduction in hydrostatic pressure and can cause an increase in accumulation of abscisic acid in plant tissues which resulted in the inhibition of protein synthesis (Chandler and Robertson; 1994). These results coincided with those reported by Khalil *et al.* (2012) and Eid *et al.* (2013).

Concerning the effect of compost rates (5, 7.5 and 10 tons/fad.) on NPK content and uptake and protein content are, also, shown in Tables 5 and 6. NPK content and uptake and protein content were significantly increased with increasing compost rates, treated plants with 10 tons compost/fad., gave the highest values of NPK content and uptake and protein content in plant tissues. The increments of minerals content as a result of compost application may be attributed to the contains of microorganisms as *Azotobacter, Azospirillum.*, etc. which fix N and release phytohormones as GA, IAA, CYT.., etc. which stimulate plant growth and absorption of nutrients (Frankenberger and Arshad, 1995).

The effect of interaction treatments on NPK content and uptake are shown in Tables 5 and 6, the data on hand visualized that the greatest significant values of NPK content and uptake and crude protein content obtained under the combined effect of 3024 m^3 water with 10 tons compost compared to the other treatments. Moreover, it is clear from the same data that those minimum rates of irrigation and compost recorded the lowest values.

Anatomical Structure

As for the effect of drip irrigation rates, data observation in Table 7 show that irrigation of aubergine plants at the highest rate (3024 m^3/ fad.) gave the highest values for leaf blade parameters (midrib thickness, midrib width, midrib vascular bundle thickness, midrib vascular bundle width, external and internal phloem tissue thickness, xylem tissue thickness, number of xylem rows in midvein bundle, diameter of xylem vessel average, blade thickness,

Table 5. Effect of drip irrigation rates (m^3/fad.), compost rates (ton/fad.) and their interactions on NPK and protein contents of aubergine during 2012 and 2013 seasons

Characters		N (%)		P (%)		K (%)		Crude protein (%)	
Season		1st	2nd	1st	2nd	1st	2nd	1st	2nd
Drip irrigation rates (m^3/fad.)									
1008		1.95	2.13	0.50	0.54	1.30	1.36	12.18	13.30
2016		2.18	2.30	0.56	0.63	1.38	1.45	13.65	14.39
3024		2.25	2.40	0.60	0.67	1.43	1.49	14.08	15.01
$LSD_{0.05}$		0.07	0.04	0.02	0.01	0.09	0.06	0.34	0.43
Compost rates (ton/fad.)									
5		2.02	2.18	0.51	0.59	1.33	1.39	12.63	13.64
7.5		2.14	2.29	0.56	0.62	1.38	1.44	13.40	14.34
10		2.22	2.35	0.58	0.64	1.40	1.46	13.88	14.72
$LSD_{0.05}$		0.03	0.06	0.03	0.03	0.11	0.09	0.23	0.33
Drip irrigation rates × Compost rates									
	5	1.91	2.05	0.47	0.52	1.25	1.33	11.92	12.81
1008	7.5	1.95	2.15	0.51	0.54	1.30	1.36	12.19	13.42
	10	1.99	2.19	0.53	0.577	1.33	1.39	12.44	13.67
	5	2.01	2.19	0.52	0.60	1.33	1.41	12.58	13.67
2016	7.5	2.23	2.32	0.56	0.64	1.39	1.46	13.92	14.52
	10	2.31	2.40	0.60	0.66	1.41	1.49	14.44	14.98
	5	2.14	2.31	0.56	0.64	1.40	1.44	13.40	14.44
3024	7.5	2.25	2.41	0.61	0.68	1.44	1.51	14.08	15.08
	10	2.36	2.48	0.62	0.69	1.45	1.52	14.77	15.50
$LSD_{0.05}$		0.08	0.07	0.05	0.07	0.21	0.13	0.38	0.51

Table 6. Effect of drip irrigation rates (m^3/fad.), compost rates (ton/fad.) and their interactions on NPK uptake (kg/fad.) of aubergine during 2012 and 2013seasons

Characters		N uptake (kg/fad.)		P uptake (kg/fad.)		K uptake (kg/fad.)	
Season		1st	2nd	1st	2nd	1st	2nd
Drip irrigation rates (m^3/fad.)							
1008		48.599	58.444	12.595	14.938	32.319	37.280
2016		68.889	76.513	17.604	21.010	43.459	48.156
3024		73.630	83.561	19.465	23.318	46.706	51.773
$LSD_{0.05}$		1.121	1.087	0.741	0.623	1.007	1.639
Compost rates (ton/fad.)							
5		58.127	67.166	14.836	18.097	38.193	42.740
7.5		64.338	73.584	16.820	19.909	41.241	46.159
10		68.654	77.768	18.007	21.259	43.049	48.310
$LSD_{0.05}$		1.765	1.654	0.693	0.496	1.642	1.006
Drip irrigation rates × Compost rates							
	5	45.747	53.870	11.280	13.578	29.993	34.944
1008	7.5	48.413	59.010	12.666	14.759	32.363	37.292
	10	51.636	62.453	13.840	16.478	34.600	39.605
	5	60.412	68.594	15.511	18.816	39.920	44.117
2016	7.5	70.455	78.514	17.720	21.513	44.087	49.218
	10	75.800	82.431	19.580	22.700	46.369	51.133
	5	68.220	79.033	17.718	21.897	44.666	49.158
3024	7.5	74.146	83.229	20.074	23.456	47.272	51.968
	10	78.525	88.420	20.601	24.601	48.179	54.193
$LSD_{0.05}$		2.122	1.987	0.952	0.659	1.078	1.770

Table 7. Effect of drip irrigation rates (m³/fad.), compost rates (tons/fad.) and their interactions on counts and measurements in micron of certain anatomical features of the blade of the fourth upper leaf on aubergine plant main stem at 60 days from sowing during the second growing season 2013

Treatments		Midvein thickness	Midvein width	Midvein vascular bundle thickness	Midvein vascular bundle width	External and internal phloem tissue thickness	Xylem tissue thickness	Number of xylem rows in midvein bundle	Diameter of xylem vessel average	Blade thickness	Palisade tissue thickness	Spongy tissue thickness
		Drip irrigation rates (m³/fad.)										
1008		802.87	764.11	194.13	373.24	103.26	68.06	27.33	17.32	106.34	36.93	48.35
2016		1215.06	1400.73	297.11	796.65	131.55	84.59	51.33	21.50	117.40	42.50	56.05
3024		1517.44	1891.60	425.73	1167.81	171.35	112.44	64.67	25.59	133.24	51.74	67.68
		compost rates (ton/fad.)										
5		1023.82	1156.59	258.29	652.30	117.88	65.19	39.00	20.02	111.11	40.42	53.50
7.5		1203.30	1338.87	310.97	768.92	134.75	95.06	51.67	21.40	121.74	44.98	57.71
10		1308.26	1560.98	347.72	916.47	153.52	104.83	52.67	22.98	124.13	45.76	60.86
		Drip irrigation rates × Compost rates										
	5	690.94	567.87	158.71	257.91	90.34	64.41	10.00	18.01	98.07	34.89	46.87
1008	**7.5**	733.18	666.23	159.74	313.83	90.72	58.28	32.00	15.65	108.07	37.91	47.34
	10	984.49	1058.23	263.95	547.98	128.72	81.48	40.00	18.29	112.88	38.00	50.83
	5	1013.54	1124.24	245.93	608.14	105.80	55.26	43.00	20.75	113.25	41.11	54.41
2016	**7.5**	1305.58	1498.43	320.05	898.96	136.07	97.32	58.00	21.31	119.38	42.44	56.77
	10	1326.05	1579.53	325.34	882.84	152.77	101.18	53.00	22.44	119.57	43.94	56.96
	5	1366.97	1777.65	370.22	1090.86	157.50	75.91	64.00	21.31	122.02	45.26	59.22
3024	**7.5**	1571.13	1851.96	453.11	1093.97	177.47	129.57	65.00	27.25	137.77	54.60	69.03
	10	1614.23	2045.18	453.87	1318.60	179.08	131.83	65.00	28.20	139.94	55.35	74.78

palisade tissue thickness and spongy tissue thickness) as compared to other irrigation rates (2016 and 1008 m³/fad.), in addition, high water stress level (1008 m³/fad.) markedly decreased all the previous mentioned parameters of leaf blade.

The obtained results are in good accordance with that previously recorded by Mohamed *et al.* (2001) on roselle plant, Anwar (2005) on potato plant, Saad El-Deen (2006) on sesame plant and Desoky *et al.* (2013) on wheat plant.

It is clear from the results that the anatomical parameters of leaf blade were reduced under water deficit conditions. Ahmed (1990), Mohamed (1996) and Mohamed *et al.* (2001) reported that water deficit triggers a change in hormonal balance, including an increase in leaf ABA (abscisic acid) and/or a decline in cytokinins. The increase in leaf ABA reduces cell wall extensibility and therefore causes a decline in cell elongation. Jia *et al.* (2001) suggested that the initiation of water deficit induced ABA accumulation was in fact brought about by weight loss of the leaf tissues as reflected by changes of cellular volume, rather than by water parameters. Tayler *et al.* (2005) discussed the highest ABA contents might be related to the damage in the photosynthetic tissue of young tillers under water stress and to the availability of xanthophylls precursors for ABA, Cytosol ABA increases during water stress as a result of synthesis in the leaf, redistribution within mesophyll cells, import from the roots and recirculation from other leaves. This in turn gives early warning for stomatal closure to save water through hormone, redistribution in the plant. Drought usually induces the accumulation of reactive oxygen species (ROS), which cause oxidative damage to plants (Apel and Hirt, 2004) and (Papadakis and Angelakis, 2005).

Concerning the effect of compost rates, it is clear from the data in the same Table that promotive effect of compost on aubergine leaf previous mentioned parameters, which markedly increased with increasing compost rate from 5 to 10 m^3/fad. Fertilization aubergine plants with compost at high rate (10 m^3/fad.) gave the highest values for leaf blade previous mentioned parameters as compared to other rates. These obtained results are almost in harmony with those obtained by Ramadan *et al.* (2003); Abou-Bakr *et al.* (2005) and Hassan *et al.* (2006). Tartoura (2010) reported that wheat plant biomass production was higher in compost treated plants than that in untreated ones. Stimulatory effects of compost on plant growth have often been related to alteration of the chemical and physical properties of the soil, increasing organic matter content, water holding capacity, microbes diversity, providing macro- and micronutrients essential for plant growth and suppressing plant diseases which collectively contributes to plant growth enhancement (Hansch and Mendel 2009; Tejada *et al.* 2009). Lawson *et al.* (2004) suggested that growth and nodulation of the legumes were improved by the composts; the possible improvement of plant growth by compost may be due to the improving in moisture and availability of plant nutrients, especially calcium.

Lawson *et al.* (1995) found that the application of compost improved soil moisture status and exchangeable calcium. Mazhar *et al.* (2011) mentioned that all growth parameters and chemical constituents, except the percentage of Na and proline content, tended to increase by increasing the rates of Nile compost up to 200 g/pot as compared to the untreated ones.

Data in Table 7 and Fig. 1 indicate the interaction effect between drip irrigation rates and compost rates. It is evident from such data that all interaction treatments either under water stressed or under non-stressed had a prominent increase in the thickness of midrib region, dimensions of vascular bundle (thickness and width) as well as leaf blade thickness corresponding to an increase in the thickness of palisade and spongy tissues. Generally, compost treatments help to partially compensate the reduction in thickness of midrib region and leaf blade of aubergine that caused by water stress. Therefore, the compost overcome the destructive effect of water stress. The same data presented in Table 7 and Figure 1 reveal that the moderate irrigation of aubergine (2016 m^3/fad.) and high fertilization with 10 tons compost/fad. tended to become similar to that of the high irrigation 3024 m^3/fad., without compost. Tartoura (2010) suggested that compost alleviates oxidative damage in wheat plants grown under drought by improving plant growth and activating antioxidant defense systems, thereby improving stability of membranes in plant cell and enhancing drought tolerance of plant under water deficit conditions. The presented results are in agreement with those obtained by Tartoura (2010) who reported that application of compost had markedly alleviated oxidative stress damage in wheat induced by drought as indicated by improving total biomass production (TBP) and decreasing activated oxygen species, thereby reducing lipid peroxidation. It is interesting to note that the levels of superoxide (O_2) anion radical and hydrogen peroxide (H_2O_2) along with the by-product of lipid peroxidation {malondialdehyde (MDA)} were significantly lower in compost treated plants than in untreated ones under well-watered and drought stress conditions.

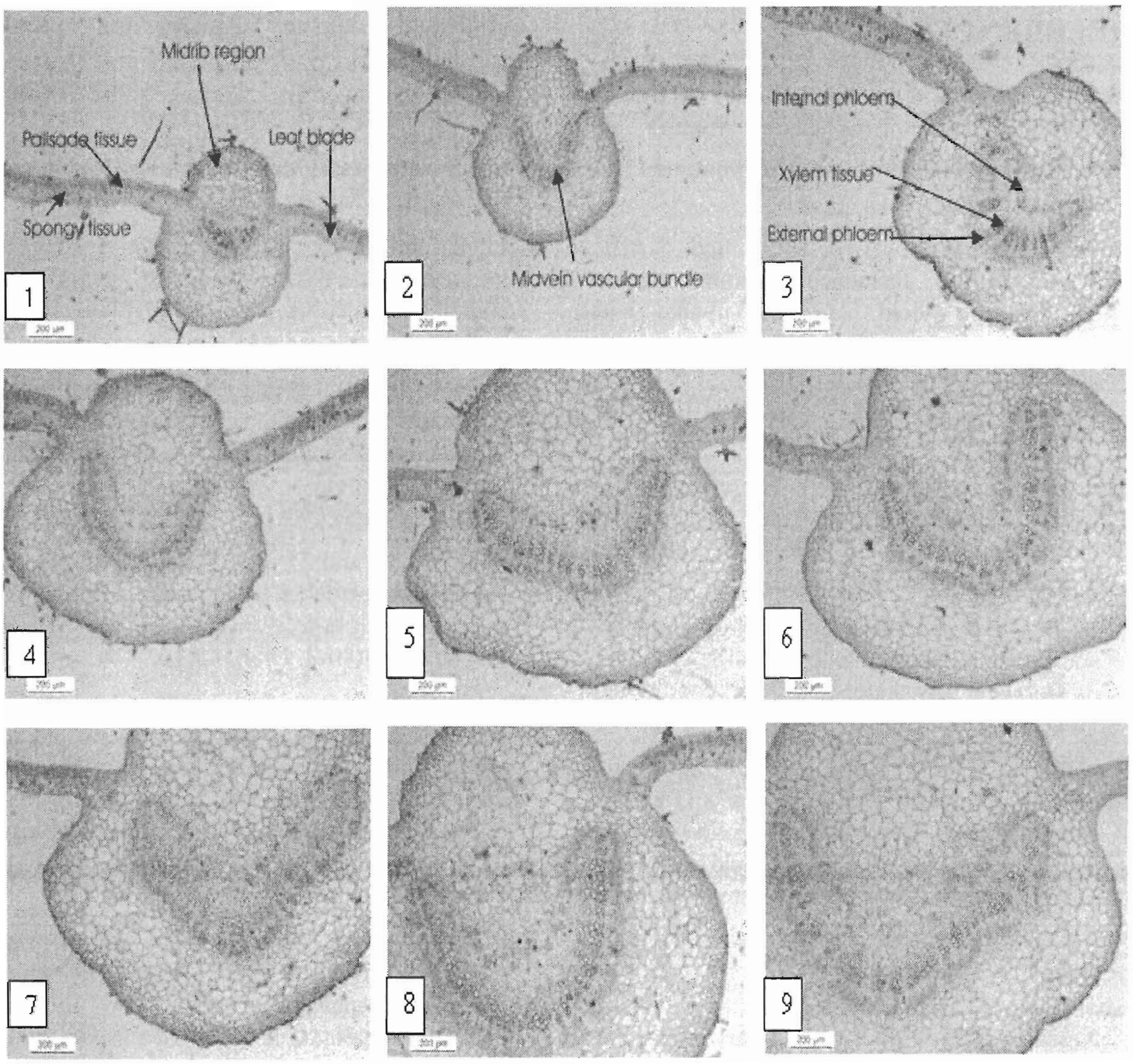

Fig. 1. Transverse sections of aubergine plant blade of the fourth upper leaf on main stem as affected by interactions between drip irrigation and compost rates during the second growing season 2013 (Scale bars 0.2 mm)

1: Drip irrigation at 1008 m^3/fad. and compost rate at 5 tons /fad.

2: Drip irrigation at 1008 m^3/fad. and compost rate at 7.5 tons /fad.

3: Drip irrigation at 1008 m^3/fad. and compost rate at 10 tons /fad.

4: Drip irrigation at 2016m^3/fad. and compost rate at 5 tons /fad.

5: Drip irrigation at 2016m^3/fad. and compost rate at 7.5 tons /fad.

6: Drip irrigation at 2016m^3/fad. and compost rate at 10 tons /fad.

7: Drip irrigation at 3024 m^3/fad. and compost rate at 5 tons /fad.

8: Drip irrigation at 3024 m^3/fad. and compost rate at 7.5 tons /fad.

9: Drip irrigation at 3024 m^3/fad. and compost rate at 10 tons /fad.

REFERENCES

AOAC (2002). Association of Official Analytical Chemists.Official Method of Analysis. Published by AOAC Internat. 17th ed. Washington, D.C.

Abdel-Moez, M.R., A.L. Saleh and S.A.H. Wanas (1999). Influence of some organic compost on yield, nutrients uptake and consumptive use of fennel and coriander plants and some soil physical properties. J. Agric. Sci., Mansoura Univ., 24 (10): 6237-6253.

Abe, H. and T. Nakai (1999). The effect of the water status within a tree on tracheid morphogenesis in *Cryptomeria japonica* Trees: Structure and Function, 14 (3): 124-129.

Abou El-Khair, E.E. (2004). Effect of irrigation and fertilization treatments on garlic crop and its storageability under sandy soil conditions. Ph.D. Thesis, Fac. Agric., Zagazig Univ., Zagazig, Egypt.

Abou El-Khair, E.E., D.A.S. Nawar and R.S.E. Anwar (2011). Effect of drip irrigation systems and water quantity on growth, yield and water use efficiency of sweet potato plant grown under sandy soil conditions. Zagazig J. Agric. Res., 38 (1): 60-75.

Abou-Bakr, M.H.A., H.R. Hassan and D.M.A. Nassar (2005). Effect of soil treatment with effective micro-organisms as biofertilizer on morphological characters, yield and anatomical structure of potato plant (*Solanum tuberosum* L.) J. Agric. Sci., Mansoura Univ., 30 (11): 6701-6721.

Ahmed, R.B. (1990). Physiological studies on drought resistance of fig transplants. Ph. D. Thesis, Fac. Agric., Hort. Dept., Ain Shams Univ., Cairo, Egypt.

Alam, M.N., M.S. Jahan, M.K. Ali, M. A. Ashraf and M.K. Islam (2007). Effect of vermicompost and chemical fertilizers on growth, yield and yield components of potato in Barind Soils of Bangladesh. J. Appl. Sci. Res., 3(12): 1879-1888.

Ali, T.B. and A.A. Ali (2013). Response of sweet pepper plants to organic manure and potassium humate. Ann. Agric. Sci., Moshtohor, 51 (1): 35-44.

Anwar, R.S. (2005). Response of potato crop to biofertilizers, irrigation and antitranspiration under sandy soil conditions. Ph.D. Thesis, Fac. Agric., Zagazig Univ., Egypt.

Apel, K. and H. Hirt (2004). Reactive oxygen species: metabolism, oxidative stress and signal transduction. Ann. Rev. Plant Biol., 55: 373-399.

Atia, N.A. and A. Bardisi (2005). Response of pea plants to FYM and mixture spray of some micro-elements under sandy soil conditions. The 6th Arabian Conference for Hort., Ismailia, Egypt, 158-175.

Chandler, P.M. and M. Robertson (1994). Gene expression regulated by abscisic acid and its relation to stress tolerance. Annu. Rev. Plant Physiol. Plant Mol. Biol., 45:113-141.

Desoky, E.M., G.S.A. Eisa, N.M. El-Sarkassy and M.R.A. Tohamy (2013). Effect of some antitranspirant products on growth, yield and anatomical structure of wheat plant leaf (*Triticum aestivum* L.) under water stress conditions. Zagazig J. Agric. Res., 40 (2): 223-237.

Eid, T.A., S.M.M. Ali and N.H. Abou-Baker (2013). Influence of soil moisture depletion on water requirements, yield and mineral contents of potato. J. Appl. Sci. Res., 9(3): 1457-1466.

El-Shafie, F.S. and S.A. El-Shikha (2003). Productivity and nutrients uptake of wheat and faba bean grown on calcarous soil as affected by organic manure and saline irrigation water. Minufiya J. Agric. Res., 28 (3): 1025-1048.

El-Zohery, S.S.M. (2004). Physiological studies on garlic crop. Ph.D. Thesis, Fac. Agric., Moshtohor, Zagazig Univ., Egypt.

Frankenberger, W.T.G.R. and M. Arshad (1995). Phytohormones in soil microbial production and function. Marcel Dekker inc. New York Basel , Hong Kong, 503.

Hammad, S.A., M.R. Mohamed, E.M. Selim and M.M. El-Shazly (2008). Potato yield and nutrients content as affected by silicate bacteria and both FYM and potassium rates. Mansoura, J. Agric. Sci., 33 (1): 835-846.

Hansch, R. and R.R. Mendel (2009). Physiological functions of mineral micronutrients (Cu, Zn, Mn, Fe, Ni, Mo, B, Cl). Curr. Opin. Plant Biol., 12: 259-266.

Hassan, H.R., D.M.A. Nassar and M.H.A. Abou-Bakr (2006). Effect of mineral and biofertilizers on growth, yield components, chemical constituents and anatomical structure of moghat plant (*Glossostemon bruguieri* Desf.) grown under reclaimed soil conditions. J. Agric. Sci., Mansoura Univ., 31(3): 1433-1455.

Jafar, M.S., M.H.E Slam, A.S.R. Amir, N. Ghorban and Z. Ghasem (2007). The effects of water deficit during growth stages of canola (*Brassicca napus* L.). Amer. Eurasian. J. Agric and Environ. Sci., 2 (4): 417-422.

Jia, W., J. Zhang and J. Liang (2001). Initiation and regulation of water deficit-induced abscisic acid accumulation in maize leaves and roots: Cellular volume and water relation. J. Exp. Bot., 52: 295-300.

Kandil, A.A., A.N. Attia, M.A. Badawi, A.E. Sharief and W.A.E. Abido (2011). Influence of water stress and organic and inorganic fertilization on quality, storability and chemical analysis of potato (*Solanum tuberosum* L.). J. Appl. Sci. Res., 7(3):187-199.

Khalil, A. M., S.E. Khalil and T.B. Ali (2012). Effect of water stress, antioxidants and humic acid on *Capsicum annuum* L. growth, yield and active ingredient under sandy soil conditions. Egypt. J. Appl. Sci., 27 (1): 35-56.

Klute, A. (1986). Methods of soil analysis: part I. physical and mineralogical methods (2nd ed.) Amer. Soc. Agron. Monograph No. 9. Madison-Wisconsin. U.S.A.

Lawson, I.Y.D., K. Muramatsu and I. Nioh (1995). Effect of organic matter on the growth, nodulation and nitrogen fixation of soybean grown under acid and saline conditions. Soil Sci. Pl. Nutr., 41: 721-728.

Lawson, I.Y.D., M. Hayatsu and I. Nioh (2004). Effect of compost application on growth and nodulation of kidney bean, soybean and alfalfa under salt stress. West African J. Appl. Ecol., 5: 1-9.

Makaraviciute, A. (2003). Effect of organic and mineral fertilizers on the yield and quality of different potato varieties. Agron. Res., 1 (2): 197-209.

Marschner, H. (1998). Mineral Nutrition of Higher Plants. 2nd ed. Acad. Press Limited, Text Book, 864.

Mazhar A.M.M., N.G. Abdel-Aziz, S.I. Shedeed and S.M. Zaghloul (2011). Effect of Nile compost application on growth and chemical constituents of Jatropha curcas grown under different salinity levels of diluted sea water. Australian J. Basic and Appl. Sci., 5 (9): 967-974.

Medany, M.A., M.M. Wadid and A.F. Abou-Hadid (1997). New extension system for modern irrigation management in Egypt. Acta Hort., 562: 407-411.

Mohamed, S.A. (1996). Influence of some environmental treatments on the growth and yield of cassava (*Manihot esculenta* Crantz.). Ph. D. Thesis, Fac. Agric., Fayoum Univ., Cairo, Egypt.

Mohamed S.A., M.A. El-Yazal, R.A. Medani and R.A. Agamy (2001). Effect of nitrogen and some micronutrient fertilizers under different irrigation intervals on growth, yield and some chemical constituents of roselle (*Hibiscus sabdariffa* L.) plant grown in calcareous soil. Fayoum J. Agric., Res. and Develop., 15 (2): 30-49.

Mohsen, A.A.M. (2006). Studies on the effect of bio, organic and chemical fertilizers on growth and yield and its quality of tomato under sandy soil conditions. M.Sc. Thesis, Fac. Agric., Zagazig Univ., Egypt.

Nassar, M.A. and K.F. El-Sahhar (1998). Botanical Preparations and Microscopy (Microtechnique). Academic Bookshop, Dokki, Giza, Egypt, 219 (In Arabic).

Nelson, K.L., D.H. Lynch and G. Boiteau (2009). Assessment of changes in soil health throughout organic potato rotation sequences. Agriculture, Ecosystems and Environ. 131 : 220-228.

Nour, E.M.E (2004). Physiological studies on pea crop under sandy soil conditions. Ph.D. Thesis, Fac. Agric., Zagazig Univ., Zagazig, Egypt.

Onder, S., M.E. Caliskan, D. Onder and S. Caliskan (2005). Different irrigation methods and water stress effects on potato yield and yield components. Agric. Water Management 73: 73–86.

Page, A.L., R.H. Miller and D.R. Keeny (1982). Methods of soil analysis part II. Chemical and microbiological properties (2nded.) Amer. Soc. Agron. Monograph No. 9. Madison-Wisconsin. U.S.A.

Papadakis, A.K. and K.A.R. Angelakis (2005). Polyamines inhibit NADPH oxidase mediated superoxides generation and putrescine prevents programmed cell death syndrome induced by the polyamine oxidase generated hydrogen peroxide. Planta, 220: 826-837.

Ramadan, B.S.H., H.R. Hassan and F.A. Abdo (2003). Effect of minerals and biofertilizers on photosynthetic pigments, root quality, yield components and anatomical structure of sugar beet (*Beta vulgaris* L.) plants grown under reclaimed soils. J. Agric. Sci., Mansoura Univ., 28 (7): 5139-5160.

Saad El-Deen, A.M. (2006). Botanical studies on sesame plants (*Sesamum indicum* L.) grown under newly reclaimed soil as affected by irrigation intervals and hill spacing. Fac. Agric., Fayoum Univ., 16-18.

Saxena, R. and S. Nautiyal (2001). Variation in growth and survival of five seed-sources of *Pinus roxburchii* sarg. under various stages of water stress. Plant Physiol., 5: 563-573.

Shazly, A.A. (2008). Response of tomato plants to different sources of nitrogenous fertilizers under sandy soil conditions. M.Sc. Thesis, Fac. Agric., Zagazig Univ., Egypt.

Snedecor, G.W. and W.G. Cochran (1990). "Statistical Methods" 8th ed. Iowa State Univ., Iowa, USA. Soil and Environ., 28(2): 130-135.

Tahoun, S.A., E.A. Abdel-Bary and N.A. Atia (2000) A green house trial in view of organic farming in Egypt. Egypt. J. Soil Sci., 40 (4): 469-479.

Tartoura K.A.H. (2010). Alleviation of oxidative stress induced by drought through application of compost in wheat (*Triticum aestivum* L.) plants. Amer. Eurasian J. Agric. and Environ. Sci., 9 (2): 208-216.

Tawfik, K.M. (2008). Effect of water stress in addition to potassium application on mung bean. Aust. J. Basic and Appl. Sci., 2 (1): 42-52.

Tayler, I.B., T. Sonneveld, T.D.H. Bugg and A.J. Thompson (2005). Regulation and manipulation of the biosynthesis of Abscisic acid including the supply of xanthophylls precursors. J. Plant Growth Regul.,24:253-273.

Tejada, M., M.T. Hernandez and C. Garcia (2009). Soil restoration using composted plant residues: Effect on soil properties. Soil Till. Res., 102: 109-117.

Van Diepeningen, A.D., O.J. De Vos, G.W. Korthals and A.H.C. Van Bruggen (2006). Effects of organic versus conventional management on chemical and biological parameters in agricultural soils. Agr. Ecosys. Environ., 31: 120-135.

Wang, F.X., K. Yaohu, L. Shi-Ping and H. Xiao-Yan (2007). Effects of soil matric potential on potato growth under drip irrigation in the North China Plain. Agric. Water Manage, 78: 34 - 4 2.

Youssef, M.S. (2007). Effect of some agricultural treatments on the growth, productivity, quality and storageability of potato. Ph.D. Thesis, Fac. Agric., Zagazig Univ.

Yuan, B.Z., S. Nishiyama and Y. Kang (2003). Effects of different irrigation regimes on the growth and yield of drip irrigated potato. Agric. Water Manage, (63): 153-167.

Zwart, S.J. and W.G.M. Bastiaanssen (2004). Review of measured crop water productivity values for irrigated wheat, rice, cotton and maize. Agric. Water Manag., 69(2): 115-133.

تأثير كل من معدلات الرى بالتنقيط والكومبوست على الانتاجية والتركيب التشريحى للباذنجان النامى تحت ظروف الاراضى الرملية

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أجريت هذه التجربة خلال الموسيمين الصيفيين ٢٠١٢ ، ٢٠١٣ بمحطة بحوث البساتين بالقصاصين ، محافظة الإسماعيلية ، مصر لدراسة تأثير معدلات الرى بالتنقيط (١٠٠٨، ٢٠١٦ ، ٣٠٢٤ م^{٣}/فدان)، ومعدلات الكومبوست (٥ ، ٧,٥ ، ١٠ طن/فدان) والتفاعل بينهم على النمو والمحصول والتركيب التشريحى لهجين الباذنجان تاسكا تحت ظروف الأراضى الرملية، وقد أظهرت النتائج المتحصل عليها أن النمو الخضرى والمحصول ومكوناته والمحتوى المعدنى والصفات التشريحية لأنسجة نصل الورقة زيادة معنوية مع زيادة معدلات الرى بالتنقيط من ١٠٠٨ الى ٣٠٢٤ م^{٣}/فدان، فى حين أدى الرى بالتنقيط (١٠٠٨ م^{٣}/فدان) إلى تثبيط لمعظم الصفات المدروسة، كما أظهرت البيانات أن كلا من النمو الخضرى والمحصول ومكوناته والمحتوى المعدنى والصفات التشريحية لأنسجة نصل الورقة قد تأثر معنويا بمعدلات الكومبوست وكان أفضل معدل هو ١٠ طن/فدان مقارنة بباقى المعدلات الأخرى حيث سجل أعلى القيم، وعموما فقد أدى رى نباتات الباذنجان بمعدل ٣٠٢٤ م^{٣}/فدان مع التسميد العضوى بمعدل ١٠ طن/فدان إلى تحسين النمو الخضرى والمحصول ومكوناته والمحتوى المعدنى والصفات التشريحية لأنسجة نصل الورقة مقارنة بباقى معاملات التفاعل.

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