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STUDIES ON GRAFTING AND SOME FOLIAR SPRAY TREATMENTS ON WATERMELON PRODUCTIVITY UNDER NORTH SINAI CONDITIONS

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ABSTRACT

The influences of grafting treatments (6001 and Star rootstocks in addition to, check nongrafted transplants) and some foliar spray treatments (potassium silicate at rate 4 and 5 ml/L, calcium at rate 1 and 2 ml/L and check) on growth, yield and fruit quality of watermelon cv. Aswan F1 were investigated. The experiment was conducted in Baloza Research Station, Desert Research Center, at North Sinai Governorate during the two successive growing seasons of 2016 and 2017. The results indicated that plants sprayed with potassium silicate at a rate 5 ml/L or grafted onto Star rootstock recorded the highest significant values on transplant stand (success) percentage, vegetative growth characteristics (plant length, fresh and dry weight), yield and its components (fruit weight, fruit size, rind and flesh thickness and total yield), while the lowest values were observed in check nongrafted plants. Meanwhile, grafting had reducing effect on fruit quality, where the highest values of total soluble solids and total sugars were found in the fruits of nongrafted plants. The application of 5 ml/L potassium silicate gave the best significant values of TSS and total sugars compared with check treatment during the two studied seasons.

Keywords: Watermelon, Grafting, Rootstock, Foliar spray, Potassium silicate. Calcium

INTRODUCTION

Watermelon is one of the most important vegetable crops in Egypt which occupies a great position in the local consumption and export. The total area cultivated with watermelon was about 52352 ha and the total production was about 1.68 million ton with an average yield of 32.1 ton/ha **(FAOSTAT, 2016)**.

Watermelon plants are exposed a lot of stresses under the desert conditions. Therefore, there was an urgent necessity to find effective solutions to overcome these stresses, so was the resort to grafting. Nowadays grafting is one of the most important methods for plant propagation widely used in horticulture, whereby tissues of plants are joined so as to continue their growth together as a single plant **(Hartmann et al 2002)**. Vegetable grafting is a very old technique that first appeared in Korea and Japan in 1920 by grafting watermelon onto bottle gourd rootstock (**Lee, 1994)**, and then spread in many countries of the world as a technique for the proliferation of vegetable plants such as watermelon **(Kroggel and Kubota, 2017)**, squash **(Oda, 2002)**, tomato **(Bhatt et al 2015)**, cucumber **(Gao et al 2015)**, eggplant **(Gisbert et al 2011)** and pepper **(Jang et al 2012)** because they achieve the following purposes: improve plant growth, yield and fruit quality, reduce bacterial, fungal and viral infections in shoot and roots, control soil borne diseases, increase nutrient and mineral uptake and increase plant tolerance to stress **(Singh and Rao, 2014)**.

Potassium silicate plays an important role on growth, yield and fruit quality of watermelon by improving plant resistance to biotic and abiotic stresses such as disease infections and pests, salinity, drought, high temperature, and nutrient imbalance (**Ma, 2004).** Potassium treatment induces many positive effects on fruit quality through increasing shelf life, total soluble solids, ascorbic acid and total sugar concentrations **(Lester et al 2010)**. In the same trend, potassium foliar application affected positively fruit yield and quality, photochemical compounds (beta-carotene and ascorbic acid) and fruit sugar contents on cantaloupe plants (**Jifon and Lester, 2011)**. Moreover, **Kim et al (2015)** showed that potassium silicate application led to increasing fresh and dry weight, stem diameter, nutrient concentrations such as P and K in leaves, chlorophyll content, fruit weight, merchantable watermelon fruits and sugar content. Taking into consideration, silicon increases the control of viral, fungal and bacterial diseases in plants **(Sakr, 2016)**. Also, **Abd-Alkarim et al (2017)** on cucumber plants found that silicon led to improving fruit quality characteristics such as increased values of ascorbic acid and total soluble solids.

Calcium plays an important role in increasing quality, reducing physiological disorders in vegetables and fruits during storage, retarding senescence and extending fruit life of during trading after harvest **(Poovaiah, 1986)**. Calcium is very effective in reducing tissue degradation, stabilizing cell membranes, increasing fruit firmness and rind thickness, delaying senescence and prolonging fruit life after harvest and during storage **(Johnstone et al 2008)**. In the same trend, **Scott et al (1993)** reported that calcium affected positively yield, rind tissue the elemental concentration of watermelon leaves and reduced the incidence ofblossom-end rot, while calcium treatment did not affect soluble solids content and flesh redness in watermelon fruits. Calcium deficiency during ripening of muskmelon fruits leads to lower quality through degradation texture, glassiness, fruit and flesh firmness **(Serrano et al 2002)**. On another study, on cantaloupe plants, **Madrid et al (2004)** reported that calcium improves peel and pulp color, rind thickness and calcium concentration in the fruit. Calcium foliar application improved fruit quality of melon and its components such as marketable yield, flesh firmness, total soluble solids and calcium content in rind and pulp **(Bouzo and Cortez, 2012).**

Therefore, the purpose of the present study was to study the influence of grafting and the foliar spray of potassium silicate and calcium on the growth and productivity of watermelon.

MATERIALS AND METHODS

The experiment was conducted in Baloza Research Station, Desert Research Center, at North Sinai Governorate, Egypt, during the two successive growing seasons of 2016 and 2017, to study the effect of grafting and some foliar spray treatments on vegetative growth, yield and fruit quality of watermelon cv. Aswan F1. The grafting process was carried out on watermelon plants in a private nursery for vegetables in Berqash area, Giza governorate by using tongue approach grafting method. This method was characterized by a uniform growth and higher success of grafted transplants (**El-Kersh et al 2016).** Plants were transplanted on June 10^{th} and April 14^{th} in the first and second season, respectively. The area of the experimental plot was 60 m^2 contained one row of 30.0 m length and 2.0 m width and the distance between plants was 1.0 m apart. All agricultural practices including soil preparation for agriculture, irrigation, fertilization and plant protection against weeds, diseases and pests were performed as recommended by the Ministry of Agriculture in Egypt for watermelon production. The chemical analyses of the experimental soil were carried out according to **Burt (2004)** is presented in **Table (1)**.

Table 1. Chemical analysis of the experimental soil:

Soluble cations (meq / 100g)				Soluble anions (meq /100g)				pH	EC (dS/m^2)	SAR	ESP
Ca^{2+}	Mg^{2+}	Na^+	K^+	CO_3^{2-}	HCO_3^-	Cl^-	SO_4^{2-}				
21.7	13.8	13.9	1.1	-	5	18.4	27	7.89	5.04	3.30	3.48

The drip irrigation method was used in the experiment. The analysis of irrigation water is shown in **Table (2)**.

Table 2. Chemical analysis of the AS-Salam conduit water

Soluble cations (meq / 100g)				Soluble anions (meq / 100g)				pH	EC (dS/m^2)	SAR	ESP
Ca^{2+}	Mg^{2+}	Na^+	K^+	CO_3^{2-}	HCO_3^-	Cl^-	SO_4^{2-}				
8.2	3.5	13.9	.43	-	6	15.2	4.8	7.23	2.6	5.75	6.73

The experiment was arranged in a split plot design with three replicates, every replicate included fifteen treatments which were the combinations of three grafting and five foliar spray treatments. The main plots were devoted to the foliar spray treatments, while the sub-plots were occupied with the grafting treatments.

The experimental treatments

A. Grafting treatments: Two rootstocks were used, namely 6001 and Star, in addition to check nongrafted transplant. Watermelon cv. Aswan F1 used as scion.

B. **Foliar spray treatments:** Watermelon plants in each plot were sprayed after thirty days of transplanting and repeated every ten days with:

1- Potassium silicate at two concentrations (4and 5 ml/L). The used potassium silicate (FTE Silika) contained 25% SIO_3 and 15% K_2O.
2- Calcium at two concentrations (1 and 2 ml/L . The used calcium (Agronom Calcium) contained 10.4% Ca, 8% N, 1% B and 1% Lignosulfonic acid.
3- Spray with water (check).

Data Recorded

Vegetative growth measurements

Transplant stand (success) percentage was measured after 15 days from transplanting. The other growth parameters such as plant length, fresh and dry weight were recorded before fruit harvesting in samples of three plants randomly chosen from each experimental plot.

Fruit yield characteristics

Three fruits from each experimental plot were randomly taken to estimate fruit weight, size and diameter, flesh and rind thickness, total yield per plant and per feddan.

Chemical analyzes

The vegetative growth was dried in an oven at 70°C until constant weight then calcium and potassium contents were measured by flame photometer according to **Hemingway (1956)** and **Irri (1976)**. In fruits, the values of total soluble solids were measured by using hand refractometer according to the methods of **A.O.A.C. (1975)** and the total sugar content was determined according to Shaffer and Somogyi method which described by **Ranganna (1977)**.

RESULTS AND DISCUSSION

Vegetative growth

Data recorded in **Table (3)** indicated that spraying watermelon plants with potassium silicate at rate of 5 ml/L produced the highest significant values of plant length, fresh and dry weight compared with check treatment which recorded the lowest values in both tested season. These results agree with **Jifon and Lester (2011); Olaniyi and Tella (2011)** and **Kim et al (2015)** who showed that potassium silicate spray was very effective in increasing growth characteristics of watermelon plants.

As regard to grafting, plants grafted onto Star rootstock gave the highest transplant stand (success) percentage compared to plants grafted onto 6001 rootstock which recorded the lowest value. It was 90.83, 88.33 and 81.25, 74.16 for plants grafted onto Star and 6001 rootstocks respectively in both seasons. Plant length, fresh and dry weight gave the highest values when Star rootstock was used compared with the other grafting treatments in the two growing seasons. These results may be due to vigorous root system which is able to absorb water and nutrients more efficiently, especially in the soil which suffer from stress such as salinity and drought (**Poor, 2015**; **Kroggel and Kubota, 2017).** These results are in line with those of **Khankahdani et al (2012); Abd El-Wanis et al (2013); Qin et al (2014); Poor (2015)** and **El-Gazzar et al (2016)** who stated that grafting significantly gave better performance than nongrafted plants in plant growth.

As for the interaction between foliar spray and grafting treatments, the highest significant values were obtained from plants grafted onto Star rootstock combined with potassium silicate spray at a concentration of 5 ml/L in both seasons.

Mineral composition of plants

Data in **Table (3)** showed that the watermelon plants were received calcium spray at a rate of 2 ml/L recorded the highest significant value of calcium percent in both seasons compared to check treatment which recorded the lowest value. Also, the highest value of potassium percent was obtained from potassium silicate spray at a rate of 5 ml/L compared to check treatment which recorded the lowest value in both seasons. Our findings are in agreement with **Okur and Yagmur (2004); Abdel-All and Ali (2013)** and **Abd-Alkarim et al (2017)** who reported similar results for mineral contents.

As for the effect of grafting, there were insignificant differences among all grafting treatments in both seasons. **Mohsen et al (2012)** and **El-Kersh et al (2016)** indicated that grafting had negative effects on plant percent of mineral.

As for the interaction between foliar spray and grafting treatments, the highest values of calcium were noticed for check nongrafted plants sprayed with calcium at rate of 2 ml/L whereas the highest values of potassium were recorded for check nongrafted plants sprayed with potassium silicate at a rate of 5 ml/L.

Fruit yield and its components

Data presented in **Tables (4 and 5)** showed that application of potassium silicate at a rate of 5 ml/L on watermelon plants gave the highest significant values of fruit yield parameters expressed as fruit weight, size and diameter, flesh thickness and total yield per plant and feddan followed in decreasing order by calcium spray at a rate of 2 ml/L compared with check treatment which recorded the lowest significant values in both seasons. These results may be due to role of potassium silicate and calcium in improving plant growth and absorption of more nutrients (Table 3). As for the effect on rind thickness, there were insignificant differences among foliar spray treatment, grafting treatment and the interaction between them in both seasons.

Concerning the rootstock treatments, watermelon plants grafted onto Star rootstock gave the highest significant values when compared with check nongrafted plants which recorded the lowest values; the differences between Star and 6001 rootstocks were insignificant in most cases. Our results are in conformity with that obtained by **Abd El-Wanis et al (2013)**; **Mahdy et al (2014)**; **Simpson et al (2015)**; **El-Kersh et al (2016)** and **Moreno et al (2016)** who showed that fruit yield parameters were increased at a high rate in grafted plants compared to nongrafted plants. The performance of grafting in fruit yield increasing may be due to the strong vegetative growth **(Table 3) (Yassin and Hussen, 2015)**, higher female flowers **(El-Gazzar et al 2016)** and higher fruit weight **(Table 4)** compared to nongrafted plants. Furthermore, grafted plants are resistant to soil borne disease **(Islam et al 2013)** and have strong root systems capable of absorbing water and mineral such as nitrogen, phosphorus, potassium and magnesium leading to increased photosynthesis, these conditions allow plants to produce higher yields **(Kroggel and Kubota, 2017).**

Concerning the effect of interaction between foliar spray and grafting treatments, plants grafted onto Star rootstock recorded the highest significant values when sprayed with potassium silicate at rate of 5 ml/L compared to all tested treatments which recorded the different values in both seasons.

Fruit quality parameters

As shown in **Table (5)** the highest significant values of fruit quality parameters expressed as total soluble solids and total sugars were obtained from plants that received potassium silicate spray at a rate of 5 ml/L in the two studied seasons compared to check treatment which recorded the lowest values. These results are similar to those of **Abdel-All and Ali (2013); Kim et al (2015)** and

Table 3. Effect of grafting and some foliar spray treatments on length, fresh and dry weight, Ca and K of watermelon plants in 2016 and 2017 seasons

Treatments		Plant length (cm)		Fresh weight (g)		Dry weight (g)		Ca (%)		K (%)	
Foliar spray	**Grafting**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**
Check	6001	193.11	258.66	320.73	536.97	109.18	279.25	0.49	0.37	0.65	0.56
	Star	210.44	267.11	324.00	563.73	103.84	301.17	0.29	0.23	0.52	0.72
	nongrafted	174.78	233.11	218.91	518.71	91.15	243.00	0.35	0.31	0.64	0.67
Mean		**192.78**	**252.96**	**287.88**	**539.80**	**101.39**	**274.47**	**0.38**	**0.30**	**0.60**	**0.65**
Potassium silicate (4 ml/L)	6001	204.11	305.55	350.66	677.07	125.25	348.62	0.40	0.52	0.85	0.72
	Star	222.00	306.55	358.50	947.93	125.68	376.63	0.45	0.50	0.73	0.66
	nongrafted	201.55	294.11	281.06	580.02	111.52	303.90	0.53	0.56	0.70	0.82
Mean		**209.22**	**302.07**	**330.07**	**735.01**	**120.82**	**343.05**	**0.46**	**0.53**	**0.76**	**0.73**
Potassium silicate (5 ml/L)	6001	228.55	326.22	372.02	988.04	133.50	366.03	0.52	0.54	0.79	0.79
	Star	229.55	329.66	402.11	1278.74	144.42	461.52	0.58	0.58	0.86	0.80
	nongrafted	201.66	303.55	308.06	649.20	116.22	351.41	0.66	0.53	0.89	0.87
Mean		**219.92**	**319.81**	**360.73**	**971.99**	**131.38**	**392.99**	**0.59**	**0.55**	**0.85**	**0.82**
Calcium (1 ml/L)	6001	203.00	275.22	344.53	637.81	117.51	304.66	0.60	0.62	0.68	0.71
	Star	212.00	275.66	355.99	737.44	112.36	321.85	0.51	0.65	0.62	0.61
	nongrafted	181.66	242.22	301.55	575.65	98.09	262.51	0.66	0.69	0.66	0.68
Mean		**198.89**	**264.37**	**334.02**	**650.30**	**109.32**	**296.34**	**0.59**	**0.65**	**0.65**	**0.67**
Calcium (2 ml/L)	6001	224.77	289.22	345.97	810.66	120.51	324.33	0.68	0.75	0.76	0.73
	Star	218.22	310.00	366.92	864.98	134.34	336.73	0.61	0.71	0.81	0.66
	nongrafted	202.78	248.22	306.00	620.77	105.18	287.11	0.77	0.81	0.74	0.73
Mean		**215.26**	**282.48**	**339.63**	**765.47**	**120.01**	**316.06**	**0.69**	**0.76**	**0.77**	**0.71**
Mean for grafting	6001	210.71	290.97	346.78	730.11	121.19	324.58	0.54	0.56	0.75	0.70
	Star	218.44	297.80	361.50	878.56	124.13	359.58	0.49	0.53	0.71	0.69
	nongrafted	192.49	264.24	283.12	588.87	104.43	289.59	0.59	0.58	0.73	0.75
$LSD_{0.05}$ for	Grafting	5.63	4.72	4.17	44.86	4.73	5.96	0.09	N.S	N.S	N.S
	Spraying	11.48	9.83	7.92	56.83	4.79	9.35	0.14	0.17	0.09	0.15
	Interaction	12.58	10.56	9.31	100.30	10.58	13.33	0.19	0.24	0.20	0.21

Table 4. Effect of grafting and some foliar spray treatments on weight, size, diameter and rind and Flesh thickness of watermelon fruits in 2016 and 2017 seasons.

Treatments		Fruit weight (kg)		Fruit size (L)		Fruit diameter (cm)		Rind thickness (cm)		Flesh thickness (cm)	
Foliar spray	**Grafting**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**
Check	6001	2.29	4.57	2.28	3.98	46.78	49.89	0.83	1.00	16.67	18.33
	Star	2.37	4.97	2.69	4.18	48.33	48.00	0.83	0.83	17.33	18.67
	nongrafted	1.71	3.52	1.62	3.70	46.89	47.44	0.67	0.67	16.67	17.67
Mean		**2.12**	**4.35**	**2.20**	**3.95**	**47.33**	**48.44**	**0.78**	**0.83**	**16.89**	**18.22**
Potassium silicate (4 ml/L)	6001	2.77	5.48	2.50	4.40	51.00	51.33	1.00	0.83	19.33	20.33
	Star	2.87	5.47	2.90	4.78	52.22	59.33	0.83	1.00	19.33	19.67
	nongrafted	2.00	4.08	1.97	4.15	50.89	53.55	0.83	0.83	18.67	19.33
Mean		**2.55**	**5.01**	**2.46**	**4.44**	**51.37**	**54.74**	**0.89**	**0.89**	**19.11**	**19.78**
Potassium silicate (5 ml/L)	6001	3.21	5.63	3.19	5.15	54.22	58.44	0.83	1.00	20.33	20.00
	Star	3.60	5.88	3.29	5.23	54.44	64.00	1.00	1.00	21.67	21.33
	nongrafted	2.12	4.85	2.25	4.70	51.77	57.66	1.00	0.83	18.67	19.67
Mean		**2.98**	**5.45**	**2.91**	**5.03**	**53.48**	**60.03**	**0.94**	**0.94**	**20.22**	**20.33**
Calcium (1 ml/L)	6001	2.58	5.20	2.61	4.38	48.89	48.67	1.00	0.83	19.00	18.67
	Star	2.73	5.19	2.88	4.42	50.33	50.55	1.00	0.83	18.67	19.00
	nongrafted	2.00	4.03	1.92	3.98	48.33	50.33	1.00	1.00	18.00	18.33
Mean		**2.44**	**4.81**	**2.47**	**4.26**	**49.18**	**49.85**	**1.00**	**0.89**	**18.56**	**18.67**
Calcium (2 ml/L)	6001	3.02	5.35	3.07	4.52	52.44	48.79	1.00	1.17	20.67	19.33
	Star	3.11	5.57	3.14	4.62	53.66	51.33	1.17	1.33	20.00	19.67
	nongrafted	2.24	4.16	2.29	4.23	49.67	51.44	1.00	1.17	18.33	18.67
Mean		**2.79**	**5.03**	**2.83**	**4.46**	**51.92**	**50.52**	**1.06**	**1.22**	**19.67**	**19.22**
Mean for grafting	6001	2.77	5.25	2.73	4.49	50.67	51.42	0.93	0.97	19.20	19.33
	Star	2.94	5.42	2.98	4.65	52.80	54.64	0.97	1.00	19.40	19.67
	nongrafted	2.01	4.13	2.01	4.15	49.51	52.08	0.90	0.90	18.07	18.73
$LSD_{0.05}$ for	Grafting	0.26	0.18	0.28	0.22	1.80	1.28	N.S	N.S	1.11	N.S
	Spraying	0.56	0.42	0.63	0.17	1.62	2.57	N.S	N.S	1.69	1.39
	Interaction	0.57	0.40	0.62	0.49	4.03	2.86	N.S	N.S	2.47	1.76

Table 5. Effect of grafting and some foliar spray treatments on plant yield, total yield, total soluble solids and total sugars of watermelon in 2016 and 2017 seasons

Treatments		Plant yield (kg)		Total yield (ton/fed)		TSS (%)		Total sugars (%)	
Foliar spray	**Grafting**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**	**2016**	**2017**
Check	6001	4.57	10.53	5.03	11.59	5.50	6.83	6.10	6.02
	Star	4.75	11.55	5.22	12.71	5.33	7.33	6.11	6.15
	nongrafted	3.42	7.04	3.76	7.75	6.83	8.67	7.06	6.94
Mean		**4.25**	**9.71**	**4.67**	**10.68**	**5.89**	**7.61**	**6.42**	**6.37**
Potassium silicate (4 ml/L)	6001	5.54	12.67	6.09	14.94	6.33	8.00	8.97	8.06
	Star	6.80	14.77	7.48	18.24	6.67	8.33	8.45	8.48
	nongrafted	4.69	9.51	5.16	10.46	6.83	9.50	9.69	8.85
Mean		**5.68**	**12.32**	**6.24**	**14.55**	**6.61**	**8.61**	**9.04**	**8.46**
Potassium silicate (5 ml/L)	6001	9.53	14.91	10.49	16.40	7.17	9.17	9.62	8.81
	Star	9.63	17.74	10.59	19.52	6.83	9.33	9.11	9.07
	nongrafted	5.11	14.65	5.62	16.12	9.50	10.17	10.52	11.27
Mean		**8.09**	**15.77**	**8.90**	**17.35**	**7.83**	**9.56**	**9.75**	**9.72**
Calcium (1 ml/L)	6001	5.90	13.90	6.49	15.29	5.67	7.83	7.55	7.44
	Star	5.45	14.06	6.00	15.47	5.67	8.17	7.13	7.62
	nongrafted	4.00	9.37	4.40	10.30	8.50	9.50	8.43	8.50
Mean		**5.12**	**12.44**	**5.63**	**13.69**	**6.61**	**8.50**	**7.70**	**7.85**
Calcium (2 ml/L)	6001	7.99	16.04	8.79	17.64	6.00	8.00	7.79	8.09
	Star	8.15	14.57	8.97	16.03	5.67	8.17	8.25	7.92
	nongrafted	5.24	9.70	5.77	10.67	8.67	9.83	9.67	9.59
Mean		**7.13**	**13.44**	**7.84**	**14.78**	**6.78**	**8.67**	**8.57**	**8.53**
Mean for Grafting	6001	6.71	13.61	7.38	15.17	6.13	7.97	8.01	7.68
	Star	6.96	14.54	7.65	16.39	6.03	8.27	7.81	7.85
	nongrafted	4.49	10.05	4.94	11.06	8.07	9.53	9.07	9.03
$LSD_{0.05}$ for	Grafting	1.23	2.61	1.35	2.87	1.07	0.60	0.82	0.93
	Spraying	1.42	3.50	1.56	3.85	1.09	1.03	1.06	2.21
	Interaction	2.75	5.83	3.02	6.41	2.39	1.34	1.84	2.08

Abd-Alkarim et al (2017) who indicated that potassium silicate treatment plays an important role in increasing fruit quality. This may be due to increase photosynthesis efficiency and good health for plant (**Kim et al 2015)** and controlling the incidence of diseases where potassium silicate strongly plays role in modulating the defense responses of melon against diseases such as powdery mildew **(Dallagnol et al 2012)**.

As regard to the effect of grafting on fruit quality, the greatest significant values were recorded in fruits of nongrafted watermelon plants compared to grafted plants which recorded the lowest values. There are many conflicting researches on changes in watermelon fruit quality due to grafting. In our experiment, we observed negative effect on fruit quality with fruits of grafted plants compared to those of nongrafted ones. Similar results were found with other researchers (**Petropoulos et al**

2014; **Kyriacou et al 2015**; **Miceli et al 2016**; **Liu et al 2017**) who stated that quality traits are influenced negatively by the rootstocks. However, others reported that grafting induces many positive effects on fruit quality through increasing total soluble solids and total sugars (**Alan et al 2007**; **Proietti et al 2008**; **Mohamed et al 2012)**. These differences may be due to the type of rootstock used, different production environments and harvesting dates **(Proietti et al 2008)**. The decrease in fruit quality parameters does not consider a general phenomenon but is related to the interaction between rootstocks and scions through the acquisition of some undesirable qualities of the rootstocks in particular growing conditions **(Crino et al 2007).**

As for the interaction between foliar spray and grafting treatments, the highest values were obtained from fruits of nongrafted plants combined with potassium silicate treatment at a rate of 5 ml/L in both seasons.

CONCLUSION

According to the obtained results under North Sinai conditions, it could be recommended that watermelon plants grafted onto Star rootstock combined with potassium silicate spray at a rate of 5 ml/L was the best treatment for enhancing vegetative growth and improving fruit yield as well as fruit quality, and it's important to conduct more researches in this concern.

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دراسات علي التطعيم وبعض معاملات الرش علي انتاجية البطيخ تحت ظروف شمال سيناء

[163]

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الموجـــــــز

أجريت تجربة حقلية فى محطة بحوث بالوظه التابعة لمركز بحوث الصحراء بمحافظة شمال سيناء، جمهورية مصر العربية، خلال موسمى الزراعة المتتاليين 2016 و2017 وذلك لدراسة تأثير التطعيم وبعض معاملات الرش علي نمو وانتاجية نباتات البطيخ. أظهرت النتائج وجود زيادة معنوية فى صفات النمو الخضرى والمحصول ومكوناته عند استخدام النباتات المطعومة علي أصل ستار والرش بسليكات البوتاسيوم بتركيز 5 مل/لتر مقارنة بالنباتات غير المطعومة ومعاملة المقارنة والتي سجلت أدني القيم في كلا الموسمين. وكان للتطعيم تأثير سلبي علي جودة الثمار حيث سجلت النباتات غير المطعومة أعلي القيم مع الرش بسليكات البوتاسيوم بتركيز 5 مل/لتر.

الكلمات الدالة: البطيخ، التطعيم، الأصول، الرش الورقي، سليكات البوتاسيوم، الكالسيوم

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