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EFFECT OF COMPOST, SALICYLIC AND ASCORBIC ACIDS TREATMENTS ON CORM PRODUCTION AND CHEMICAL CONSTITUENTS OF *GLADIOLUS GRANDIFLORUS* CV. WHITE PROSPERITY

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ABSTRACT: A field experiment was conducted to investigate the effect of plant compost (0, 7.5, 10.0 and 12.5 ton/fed) and salicylic and/or ascorbic acids (each at 0, 100 or 200 ppm) on corm production and chemical constituents of *Gladiolus grandiflorus* cv. White Prosperity.

The obtained results indicated that corm diameter, number of cormels/plant, dry weight of corm and cormels, as well as, chemical constituents including chlorophyll a, b, carotenoids and percentages of N, P and K in the corms were gradually increased by increasing the level of compost. Significant differences were detected among four used treatments. So, the high level of compost resulted the highest values.

All six treatments of salicylic acid and/or ascorbic acid significantly increased corm and cormels production and their content of chemical constituents in comparison of the control plants. The treatments of salicylic acid (100 ppm) plus ascorbic acid (100 ppm) followed by ascorbic acid (200 ppm), then salicylic acid (200 ppm) were more effective than other treatments for corm and cormels production, as well as, the percentage of nitrogen and potassium without significant differences were detected between the first and second treatments in most cases. While the treatments of salicylic plus ascorbic acids, each at 100 ppm followed by salicylic acid at 200 ppm were more effective for the pigments content (mg/g f.w.) and phosphorus percentage without significant differences between them.

The interaction between compost, salicylic acid and/or ascorbic acid was significant for all previous characters, except K %. The highest values of corm and cormels production were achieved by 12.5 ton/fed compost treatment in combination with salicylic acid (100 ppm) + ascorbic acid (100 ppm) or ascorbic acid (200 ppm), while the interaction treatments of compost (12.5 ton/fed) × salicylic plus ascorbic acids, each at 100 ppm or compost (12.5 ton/fed) × salicylic acid at 200 ppm recorded the highest contents of pigments and elements of N and P.

Key words: *Gladiolus grandiflorus*, cv. White Prosperity, compost, salicylic acid, ascorbic acid, corm production, chemical constituents.

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INTRODUCTION

Gladiolus grandiflorus, L. plant is considered one of the most important flowering bulbs grown in Egypt. There are fast expands in areas planted with gladiolus in Egypt in order to meet the increase demand for gladiolus flowers for local market and exporting, *Gladiolus* plants propagated by corms and cormels.

Organic fertilization, salicylic acid and ascorbic acid are among the important agricultural treatments which have been proved to improve corm production of gladiolus plants.

The effect of organic fertilization on increasing corm diameter, number of cormels and dry weight of corm and cormels of gladiolus were reported by many investigators, such as Gangadharan and Gopinth (2000), Zaghloul and Moghazy (2001), Atta-Alla *et al.* (2003), Ruppenthal and Castro (2005), Chandar *et al.* (2012), Ahmed (2013) and Abdou *et al.* (2013) who found that compost fertilizer improved the chemical composition of gladiolus plants.

Salicylic acid treatments were found to have stimulating effect on corm production and chemical composition of gladiolus such as those raveled by Sajjad *et al.* (2014) and Padmalatha *et al.* (2014).

In regard to corm and cormels production, as well as, chemical constituents of gladiolus, ascorbic acid treatments were found to increase corm diameter, number of cormels, dry weight of corm and cormels and pigments (chlorophyll a, b and carotenoids contents), as well as, NPK % (Abdel Aziz *et al.,* 2009 and Abo Leila and Eid, 2011).

The aim of this work was to study the effect of application compost fertilization and spraying with salicylic and ascorbic acids on corm and cormels production, as well as, chemical constituents of *Gladiolus grandiflorus* cv. White Prosperity.

MATERIALS AND METHODS

The present study was carried out at the Nursery of Ornamental Plants, Faculty of Agriculture, Minia University during two successive seasons of 2012/2013 and 2013/2014 on gladiolus plants.

Gladiolus grandiflorus cv. White Prosperity corms were obtained from Holland by Basiony nurseries, Cairo, Egypt. Average corm diameter was 2.8 and 3.1 cm and corm weight was 9.6 and 10.1 g for the first and second seasons, respectively. Corms were planted on October 1st for both seasons in 1.5 × 2.2 m plots containing 3 ridges, 50 cm apart. Corms were planted in hills, 20 cm apart (10 corms/ridge) at a depth of 5 cm under ground surface in clay loam soil. The physical and chemical analysis of the used soil are shown in Table (a).

The split plot design with three replicates was followed in this experiment. The four levels of compost fertilization treatments (0.0, 7.5, 10.0 and 12.5 ton/fed) were considered as main plots and the seven salicylic and/or ascorbic acids treatments (control, salicylic acid at 100 or 200 ppm, ascorbic acid at 100 or 200 ppm, salicylic acid + ascorbic acid, each at 100 or 200 ppm) were put in the sub-plots.

The compost was added before planting during the soil preparation. The chemical analysis of the compost is shown in Table (b).

Salicylic acid and/or ascorbic acid were applied, by hand sprayer, 3 times, one month and two months from planting date and after flowers cut for corm and cormels production. The plants were sprayed till run off. All agricultural practices were performed as usual in the region.

Table a. Physical and chemical properties of the used soil in both seasons.

Soil Character	Value		Soil Character		Value	
	2012/2013	2013/2014			2012/2013	2013/2014
Sand %	28.98	28.90	**Available P %**		15.67	15.58
Silt %	29.87	30.64	**Exch. K^+ mg/100 g**		2.85	2.64
Clay %	41.15	40.46	**Exch. Ca^{++} mg/100 g**		31.12	31.43
Soil type	Clay loam	Clay loam	**Exch. Na^+ mg/100 g**		2.51	2.50
Organic matter %	1.54	1.59	**DTPA Ext. ppm**	**Fe**	8.23	8.11
Ca CO_3 %	2.11	2.10		**Cu**	2.01	2.00
pH (1: 2.5)	7.75	7.71		**Zn**	2.87	2.89
E. C. (m mhos/cm)	1.08	1.06		**Mn**	8.11	8.15
Total N %	0.08	0.06				

Table b. Chemical analysis of the compost used in the two seasons.

Properties	Value	Properties	Value
Organic carbon	25.1	**Total P (%)**	0.5
Humidity (%)	25	**Total K (%)**	1.0
Organic matter (%)	44	**Fe (ppm)**	1750
C/N ratio	17.5	**Zn (ppm)**	60
pH (1:2.5)	8.0	**Mn (ppm)**	125
E.C. (m. mhos/cm)	5	**Cu (ppm)**	200
Total N (%)	1.5		

The following data were recorded:

1- Under ground parts characters at harvesting after the foliage had dried (the under ground parts were lifted 2 months after cut spikes): corm diameter (cm), number of new cormels/plant and dry weights of corm and cormels (g).

2- Determination of some chemical constituents: leaf samples were taken after 75 days from planting to determine chlorophyll a, b and carotenoids as mg/g f.w. using the method described by Moran (1982). The percentages of N, P and K in the dry corms (samples were taken after two months from flowering ending) were estimated according to the methods described by Wilde *et al.* (1985), Champan and Pratt (1975) and Cottenie *et al.* (1982), respectively.

All obtained data were tabulated and statistically analyzed according to MSTAT-C (1986) and the L.S.D. test at 5 % was followed to compare between the means.

RESULTS AND DISCUSSION

1- Corm and cormels production:

The data listed in Tables (1 and 2) during both seasons indicated that corm diameter, corm dry weight, number of cormels/plant and dry weight of cormels/plant were significantly increased with increasing compost level in comparison with untreated control plants. Among the three compost treatments, the high level treatment (12.5 ton/fed) resulted the highest values for all corm and cormels production over both low and medium compost treatments in the two seasons. Similar results were also revealed on gladiolus plants by Gangadharan and Gopinath (2000), Zaghloul and Moghazy (2001), Atta-Alla *et al.* (2003), Ruppenthal and Castro (2005), Chandar *et al.* (2012) and Ahmed (2013).

The increase in the corm and cormels production was attributed to the positive effect of organic fertilizers on improving the vegetative growth, as well as, stimulating the photosynthetic pigments (Table, 3) which reflected on increasing the under ground parts of gladiolus.

In relation to salicylic and/or ascorbic acids treatments, the six treatments suppressed, significantly at 5% level, the control treatment in both first and second seasons in producing wider corm, higher new cormels/plant and heavier dry weights of corms and cormels as shown in Tables (1 and 2). Among the six treatments, the combined one at low concentration (salicylic acid plus ascorbic acid, each at 100 ppm) followed by ascorbic acid (200 ppm), then salicylic acid (200 ppm) gave the highest values for corm and cormels production. Similar observations were pointed out on gladiolus plants such as Sajjad *et al.* (2014) and Padmalatha *et al.* (2014) regarding the effects of salicylic acid. While, Abdel Aziz *et al.* (2009) and Abo Leila and Eid, 2011 concerning the effects of ascorbic acid on gladiolus corm production.

The stimulatory effect of salicylic acid and/or ascorbic acid treatments on corm and cormels production may be due to their mode of action, nutrient uptake, antioxidant defense and regulation of photosynthesis and growth. Consequently increase in all corm production (Khan *et al.,* 2003 and Blokhina *et al*., 2003).

The interaction between compost, salicylic and/or ascorbic acids treatments was significant for corm diameter, number of cormels/plant and dry weights of corm and cormels per plant in the two seasons (Tables 1 and 2). The highest values were obtained

Table 1. Effect of compost, salicylic and ascorbic acid treatments on corm diameter and corm dry weight of *Gladiolus grandiflorus* cv. White Prosperity plants during 2012/2013 and 2013/2014 seasons.

Salicylic and ascorbic acids treatments (B)	Compost levels (ton/feddan) (A) 1st Season					2nd Season				
	0	7.5	10.0	12.5	Mean (B)	0	7.5	10.0	12.5	Mean (B)
	Corm diameter (cm)									
Control	3.15	3.68	3.99	4.34	3.79	3.26	3.88	4.18	4.55	3.97
Sal. at 100 ppm	3.42	3.95	4.27	4.65	4.07	3.53	4.26	4.58	4.96	4.24
Sal. at 200 ppm	3.99	4.55	4.89	4.91	4.59	4.05	4.67	4.88	5.26	4.72
Asc. at 100 ppm	3.53	4.08	4.39	4.70	4.18	3.64	4.37	4.59	5.08	4.42
Asc. at 200 ppm	4.02	4.78	4.89	5.02	4.68	4.15	4.96	5.17	5.35	4.91
(Sal.+Asc.) at 100 ppm	4.06	4.86	4.95	5.16	4.76	4.30	5.18	5.26	5.63	5.09
(Sal.+Asc.) at 200 ppm	3.59	4.26	4.58	4.91	4.34	3.73	4.46	4.67	5.16	4.51
Mean (A)	3.68	4.30	4.57	4.81		3.81	4.54	4.76	5.16	
L.S.D. at 5%	A: 0.21		B: 0.10		AB: 0.20	A: 0.32		B: 0.18		AB: 0.36
	Corm dry weight (g)									
Control	10.55	14.70	15.93	17.06	14.56	12.99	15.46	16.65	18.18	15.82
Sal. at 100 ppm	14.50	15.73	18.22	18.51	16.74	14.05	16.93	18.16	19.74	17.22
Sal. at 200 ppm	15.84	18.46	19.52	19.52	18.34	15.62	18.52	19.35	20.32	18.45
Asc. at 100 ppm	14.04	16.24	18.11	18.69	16.77	14.50	17.38	18.20	20.32	17.60
Asc. at 200 ppm	15.92	18.94	19.39	19.90	18.54	16.44	19.64	20.48	21.86	19.61
(Sal.+Asc.) at 100 ppm	16.08	19.06	19.61	20.65	18.85	17.05	20.50	20.86	22.31	20.18
(Sal.+Asc.) at 200 ppm	14.28	16.95	18.22	19.54	17.25	14.85	17.76	18.57	20.34	17.88
Mean (A)	14.46	17.15	18.43	19.12		15.07	18.01	18.90	20.44	
L.S.D. at 5%	A: 0.68		B: 0.51		AB: 1.02	A: 1.54		B: 0.58		AB: 1.16

Sal.: Salicylic acid **Asc.: Ascorbic acid**

Table 2. Effect of compost, salicylic and ascorbic acid treatments on number of cormels/plant and cormels dry weight of *Gladiolus grandiflorus* cv. White Prosperity plants during 2012/2013 and 2013/2014 seasons.

Salicylic and ascorbic acids treatments (B)	Compost levels (ton/feddan) (A) 1st Season					2nd Season				
	0	7.5	10.0	12.5	Mean (B)	0	7.5	10.0	12.5	Mean (B)
	Number of cormels/plant									
Control	30.2	35.7	39.8	43.9	29.9	33.1	39.8	44.6	53.8	42.8
Sal. at 100 ppm	33.3	38.9	43.1	47.3	40.7	37.2	43.7	48.3	57.8	46.8
Sal. at 200 ppm	40.1	46.1	51.0	54.9	48.0	41.4	48.0	52.9	62.5	51.2
Asc. at 100 ppm	35.4	41.1	45.2	49.6	42.8	39.3	45.8	50.5	59.9	48.9
Asc. at 200 ppm	41.6	47.8	51.2	55.8	49.1	42.5	49.2	54.2	63.8	52.4
(Sal.+Asc.) at 100 ppm	42.2	48.4	51.8	56.4	49.7	42.9	49.8	54.9	64.6	53.05
(Sal.+Asc.) at 200 ppm	37.1	43.0	47.8	51.6	44.9	40.8	47.3	52.1	60.5	50.2
Mean (A)	37.0	43.0	47.1	51.4		39.6	46.2	51.1	59.0	
L.S.D. at 5%	A: 3.0		B: 1.7		AB: 3.4	A: 2.8		B: 1.9		AB: 3.8
	Cormels dry weight (g)									
Control	10.06	11.91	13.28	14.65	12.48	11.17	13.43	15.06	18.15	14.45
Sal. at 100 ppm	10.83	12.60	13.97	15.34	13.19	12.35	14.51	16.03	19.21	15.53
Sal. at 200 ppm	12.96	14.89	16.51	17.76	15.53	14.04	16.03	17.64	20.59	17.08
Asc. at 100 ppm	11.52	13.39	14.69	16.14	13.94	13.07	15.20	16.86	19.89	16.26
Asc. at 200 ppm	13.46	15.51	16.59	18.10	15.92	14.04	16.26	17.93	21.29	17.38
(Sal.+Asc.) at 100 ppm	13.67	15.73	16.81	18.36	16.14	14.18	16.45	18.17	21.64	17.61
(Sal.+Asc.) at 200 ppm	12.13	14.05	15.61	16.87	14.67	13.72	15.89	17.56	20.38	16.89
Mean (A)	12.09	14.01	15.35	16.75		13.23	15.40	17.04	20.16	
L.S.D. at 5%	A: 1.32		B: 0.64		AB: 1.28	A: 1.28		B: 0.53		AB: 1.06

Sal.: Salicylic acid **Asc.: Ascorbic acid**

Table 3. Effect of compost, salicylic and ascorbic acid treatments on chlorophyll a, b and carotenoids of *Gladiolus grandiflorus* cv. White Prosperity plants during 2012/2013 and 2013/2014 seasons.

Salicylic and ascorbic acids treatments (B)	Compost levels (ton/feddan) (A) 1st Season					2nd Season				
	0	7.5	10.0	12.5	Mean (B)	0	7.5	10.0	12.5	Mean (B)
	Chlorophyll a (mg/g f.w.)									
Control	2.328	2.369	2.408	2.445	2.388	2.337	2.378	2.419	2.456	2.398
Sal. at 100 ppm	2.365	2.406	2.447	2.488	2.427	2.374	2.415	2.456	2.497	2.436
Sal. at 200 ppm	2.500	2.536	2.565	2.598	2.550	2.515	2.553	2.580	2.613	2.565
Asc. at 100 ppm	2.396	2.428	2.459	2.489	2.443	2.405	2.437	2.468	2.499	2.452
Asc. at 200 ppm	2.469	2.508	2.538	2.567	2.521	2.481	2.520	2.551	2.579	2.533
(Sal.+Asc.) at 100 ppm	2.526	2.558	2.586	2.616	2.572	2.541	2.573	2.601	2.636	2.588
(Sal.+Asc.) at 200 ppm	2.437	2.469	2.499	2.529	2.484	2.448	2.480	2.510	2.540	2.495
Mean (A)	2.432	2.468	2.500	2.533		2.443	2.479	2.512	2.546	
L.S.D. at 5%	A: 0.031		B: 0.025		AB: 0.050	A: 0.032		B: 0.024		AB: 0.048
	Chlorophyll b (mg/g f.w.)									
Control	0.756	0.769	0.783	0.796	0.776	0.759	0.773	0.787	0.799	0.780
Sal. at 100 ppm	0.768	0.782	0.796	0.809	0.789	0.772	0.786	0.801	0.814	0.793
Sal. at 200 ppm	0.813	0.825	0.835	0.847	0.830	0.820	0.833	0.845	0.856	0.839
Asc. at 100 ppm	0.779	0.788	0.799	0.810	0.794	0.782	0.791	0.803	0.814	0.798
Asc. at 200 ppm	0.803	0.816	0.826	0.836	0.820	0.808	0.821	0.832	0.843	0.826
(Sal.+Asc.) at 100 ppm	0.822	0.833	0.842	0.852	0.837	0.830	0.843	0.854	0.867	0.849
(Sal.+Asc.) at 200 ppm	0.792	0.803	0.813	0.823	0.808	0.795	0.806	0.814	0.828	0.811
Mean (A)	0.790	0.802	0.813	0.825		0.795	0.808	0.819	0.832	
L.S.D. at 5%	A: 0.010		B: 0.008		AB: 0.016	A: 0.011		B: 0.011		AB: 0.022
	Carotenoids (mg/g f.w.)									
Control	0.798	0.808	0.823	0.835	0.816	0.802	0.815	0.830	0.841	0.822
Sal. at 100 ppm	0.809	0.823	0.835	0.848	0.829	0.817	0.831	0.843	0.856	0.837
Sal. at 200 ppm	0.853	0.865	0.876	0.889	0.871	0.862	0.874	0.885	0.898	0.880
Asc. at 100 ppm	0.818	0.829	0.840	0.850	0.834	0.827	0.838	0.849	0.860	0.844
Asc. at 200 ppm	0.843	0.857	0.867	0.878	0.861	0.851	0.869	0.879	0.886	0.871
(Sal.+Asc.) at 100 ppm	0.863	0.874	0.883	0.894	0.879	0.871	0.885	0.896	0.909	0.889
(Sal.+Asc.) at 200 ppm	0.833	0.845	0.853	0.865	0.849	0.839	0.854	0.863	0.874	0.858
Mean (A)	0.831	0.843	0.854	0.866		0.838	0.852	0.864	0.875	
L.S.D. at 5%	A: 0.009		B: 0.008		AB: 0.016	A: 0.008		B: 0.010		AB: 0.020

Sal.: Salicylic acid **Asc.: Ascorbic acid**

for all corm and cormels production parameters when gladiolus plants received compost at 12.5 ton/fed and sprayed with salicylic acid (100 ppm) + ascorbic acid (100 ppm) followed by sprayed with ascorbic acid (200 ppm), then salicylic acid (200 ppm).

2- Chemical constituents:

a. Photosynthetic pigments:

The contents of chlorophyll a, b and carotenoids in the fresh leaves of *Gladiolus* cv. White Prosperity were significantly promoted due to compost treatments, in the two growing seasons, in comparison with those of untreated plants as shown in Table (3). The high level of compost (12.5 ton/fed) gave the highest values for the three photosynthetic pigments in both seasons. This results may be attributed to the increase in nutrient elements and/or positive role of organic compost on the physical and chemical properties of the soil, that reflected on the growth and the pigments content. In harmony with these results regarding organic fertilization treatments were those reported by Abdou *et al.* (2013) on gladiolus, Bahadoran *et al.* (2011) on tuberose and Rajaei and Onsinejad (2014) on tulip cv. Bright Parrot.

In relation to the influence of salicylic and/or ascorbic acids treatments, chlorophyll a, b and carotenoids contents were promoted, in the two seasons (Table, 3). Using both salicylic and ascorbic acids together each at low concentration was effective than the use of either one at low concentration or together each at 200 ppm. Also, the differences between any treatment and control was statistically significant, among the six treatments, salicylic acid (100 ppm) + ascorbic acid (100 ppm) or salicylic acid (200 ppm) resulted the highest values over all other treatments. This results may be attributed not only to the increase in nutrient elements, but also to the role of salicylic acid on stomatal regulation and photosynthesis and growth (Arfan *et al.,* 2007).

Effect of the interactions between compost, salicylic acid and/or ascorbic acid treatments was significant in both seasons, for corm diameter, number of cormels/plant and dry weights of corm and cormels with the highest values being obtained due to the use of compost at 12.5 ton/fed in combination with salicylic acid (100 ppm) + ascorbic acid (100 ppm) or salicylic acid (200 ppm) as shown in Table (3).

b. Corms content of nitrogen, phosphorus and potassium as percentages:

In both seasons, increasing the level of compost linearly increased the percentages of N, P and K in the corms. In this concern, the treatment with high level of compost (12.5 ton/fed) gave the highest percentages (Table, 4). On the other hand, the lowest values of N, P and K in the corms of gladiolus were recorded by the plants treated with organic fertilization. Moreover, significant differences were detected between compost treatments and control one, also between compost treatments in all cases.

The results mentioned above, could be attributed to that application of compost improved soil properties, increase nutrients in area of roots, which increase nutrients uptake which in turn reflects on the corm quality.

These results are in agreement with those obtained by Abdou *et al.* (2013) and Sönmez *et al.* (2013) on gladiolus, Abd El-Karim (2001) on tuberose, Eliwa *et al.* (2009) on *Iris tingitana* cv. Wedegewood and El-Sayed *et al.* (2012) on *Freesia reflecta*.

Corms percentages of N, P and K were significantly increased, in both seasons, as a result of spraying gladiolus with salicylic and/or ascorbic acids treatments in comparison with the control (Table, 4). The treatment of salicylic acid plus ascorbic acid, each at 100 ppm followed by ascorbic acid (200 ppm), then salicylic acid (200 ppm) recorded the highest values for N and K % in both seasons, without significant differences, except in case of N % in the first season. The highest P % was obtained with the treatments of salicylic acid plus ascorbic

Table 4. Effect of compost, salicylic and ascorbic acid treatments on the percentages of nitrogen, phosphorus and potassium of *Gladiolus grandiflorus* cv. White Prosperity plants during 2012/2013 and 2013/2014 seasons.

Salicylic and ascorbic acids treatments (B)	Compost levels (ton/feddan) (A) 1st Season					2nd Season				
	0	7.5	10.0	12.5	Mean (B)	0	7.5	10.0	12.5	Mean (B)
					N %					
Control	1.642	1.893	2.104	2.216	1.964	1.717	1.966	2.177	2.289	2.037
Sal. at 100 ppm	1.714	1.954	2.164	2.275	2.027	1.781	2.033	2.244	2.356	2.104
Sal. at 200 ppm	1.807	2.090	2.282	2.390	2.132	1.873	2.157	2.347	2.534	2.228
Asc. at 100 ppm	1.773	2.046	2.248	2.365	2.108	1.825	2.083	2.281	2.479	2.167
Asc. at 200 ppm	1.819	2.112	2.294	2.393	2.155	1.884	2.168	2.358	2.545	2.239
(Sal.+Asc.) at 100 ppm	1.839	2.132	2.314	2.413	2.175	1.899	2.173	2.373	2.560	2.251
(Sal.+Asc.) at 200 ppm	1.745	1.995	2.216	2.318	2.060	1.849	2.123	2.320	2.513	2.201
Mean (A)	1.763	2.032	2.232	2.339		1.833	2.100	2.300	2.468	
L.S.D. at 5%	A: 0.061		B: 0.026	AB: 0.052		A: 0.078		B: 0.024	AB: 0.048	
					P %					
Control	0.219	0.292	0.317	0.328	0.289	0.224	0.298	0.324	0.338	0.296
Sal. at 100 ppm	0.231	0.301	0.335	0.346	0.303	0.235	0.306	0.341	0.353	0.309
Sal. at 200 ppm	0.290	0.361	0.386	0.399	0.359	0.298	0.369	0.395	0.410	0.368
Asc. at 100 ppm	0.249	0.319	0.354	0.365	0.322	0.255	0.326	0.362	0.374	0.329
Asc. at 200 ppm	0.287	0.356	0.381	0.401	0.356	0.295	0.364	0.390	0.412	0.365
(Sal.+Asc.) at 100 ppm	0.298	0.370	0.395	0.406	0.367	0.306	0.379	0.405	0.418	0.377
(Sal.+Asc.) at 200 ppm	0.264	0.335	0.360	0.371	0.333	0.269	0.341	0.367	0.379	0.339
Mean (A)	0.263	0.333	0.361	0.374		0.269	0.340	0.369	0.383	
L.S.D. at 5%	A: 0.010		B: 0.012	AB: 0.024		A: 0.012		B: 0.012	AB: 0.024	
					K %					
Control	1.542	1.560	1.576	1.587	1.596	1.567	1.589	1.607	1.621	1.596
Sal. at 100 ppm	1.551	1.569	1.585	1.596	1.605	1.578	1.600	1.618	1.632	1.607
Sal. at 200 ppm	1.603	1.631	1.647	1.658	1.667	1.642	1.664	1.682	1.696	1.671
Asc. at 100 ppm	1.562	1.580	1.596	1.607	1.616	1.590	1.612	1.630	1.644	1.619
Asc. at 200 ppm	1.608	1.636	1.652	1.663	1.672	1.648	1.670	1.688	1.702	1.677
(Sal.+Asc.) at 100 ppm	1.612	1.640	1.656	1.667	1.676	1.655	1.677	1.695	1.709	1.684
(Sal.+Asc.) at 200 ppm	1.582	1.610	1.626	1.637	1.646	1.621	1.643	1.661	1.675	1.650
Mean (A)	1.580	1.604	1.620	1.631		1.614	1.635	1.654	1.668	
L.S.D. at 5%	A: 0.006		B: 0.009	AB: N.S.		A: 0.011		B: 0.013	AB: N.S.	

Sal.: Salicylic acid **Asc.: Ascorbic acid**

acid, each at 100 ppm followed by salicylic acid (200 ppm), then ascorbic acid (200 ppm) without significant differences were detected between such three superior treatments. Salicylic acid has a role in nutrient uptake (Khan *et al.,* 2003). Also, ascorbic acid is involved in a wide range of important functions as antioxidant defense and regulation of photosynthesis and growth (Blokhina *et al.,* 2003). These positive effect of the used treatments led to promoted nutrient uptake and finally reflexes on the corms percentages of N, P and K.

Abdel Aziz *et al.* (2009) and Abo Leila and Eid (2011) on gladiolus found that ascorbic acid treatment increased NPK %. Moreover, Sajjad *et al.* (2014) concluded that salicylic acid treatments (0.1, 0.4, 0.7 and 1.0 mM) increased N, P and K % in gladiolus.

Effect of the interaction treatments was significant, in both seasons, for N and P % only. The highest values were obtained with the interaction treatments of 12.5 ton/fed compost × salicylic acid (100 ppm) + ascorbic acid (100 ppm) followed by 12.5 ton/fed compost in combination with ascorbic acid (200 ppm) or salicylic acid (200 ppm) as shown in Table (4).

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تأثير معاملات الكمبوست وحامضي الساليسيلك والأسكوربيك على إنتاجية الكورمات والمحتوى الكيماوي لنباتات الجلاديولس جراندفلورس صنف وايت بروسبرتي

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أجريت تجربة حقلية خلال موسمي ٢٠١٣/٢٠١٢ و٢٠١٤/٢٠١٣ لدراسة تأثير الكمبوست (صفر – ٧,٥ – ١٠,٠ و ١٢,٥ طن/فدان) وحمضي الساليسيلك و/أو الأسكوربيك (كل بتركيز ١٠٠ أو ٢٠٠ جزء/مليون) على إنتاجية الكورمات والمحتوى الكيماوي لنباتات الجلاديولس جراندفلورس صنف وايت بروسبرتي.

أوضحت النتائج أن قطر الكورمة وعدد الكريمات/نبات والوزن الجاف للكورمة والكريمات والمحتوى الكيماوي متضمناً كلوروفيل أ، ب والكاروتينويدات والنسبة المئوية للنتروجين والفسفور والبوتاسيوم في الكورمات الجافة زاد تدريجياً بزيادة مستوى الكمبوست. يوجد فرق معنوي بين المعاملات الأربعة لذا فالمستوى العالي من الكمبوست أعطى أعلى القيم.

كل المعاملات الست لحمض الساليسيلك وحمض الأسكوربيك أحدثت زيادة معنوية في إنتاجية الكورمات والكريمات والتقديرات الكيماوية مقارنة بمعاملة الكنترول. معاملات حمض الساليسيلك (١٠٠ جزء/مليون) + حمض الأسكوربيك (١٠٠ جزء/مليون) تليها حمض الأسكوربيك (٢٠٠ جزء/مليون) ثم حمض الساليسيلك (٢٠٠ جزء/مليون) كانت أكثر فاعلية من المعاملات الأخرى فيما يخص إنتاجية الكورمة والكريمات والنسبة المئوية للنتروجين والبوتاسيوم بدون فارق معنوي بين المعاملة الأولى والثانية في معظم الحالات. بينما معاملات حامضي الساليسيلك والأسكوربيك كل عند ١٠٠ جزء/مليون تليه حمض الساليسيلك عند ٢٠٠ جزء/مليون كانت أكثر فاعلية بالنسبة للصبغات والنسبة المئوية للفوسفور بدون فارق معنوي بينهما.

تأثير التفاعل كان معنوياً لكل الصفات المدروسة عدا النسبة المئوية للبوتاسيوم. أعلى القيم لإنتاجية الكورمة والكريمات نتجت عن الكمبوست بمعدل ١٢,٥ طن/فدان مع حمض الساليسيلك (١٠٠ جزء/مليون) + حمض الأسكوربيك (١٠٠ جزء/مليون) أو حمض الأسكوربيك (٢٠٠ جزء/مليون) بينما معاملات التداخل بين الكمبوست (١٢,٥ طن/فدان) مع حمض الساليسيلك + حمض الأسكوربيك كل عند ١٠٠ جزء/مليون أو الكمبوست (١٢,٥ طن/فدان) مع حمض الساليسيلك عند ٢٠٠ جزء/مليون أعطت أعلى محتوى من الصبغات وعناصر النتروجين والفسفور.