

EFFECT OF COMPOST AND SOME STIMULATORY SUBSTANCES ON GLADIOLUS PLANT B. CORMS AND CORMELS PRODUCTIVITY AND CHEMICAL COMPOSITION

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Scientific J. Flowers & Ornamental Plants,
8(1):75-86 (2021).

Received:

3/12/2020

Accepted:

25/12/2020

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ABSTRACT: A field experiment was conducted during the two successive seasons of 2017/2018 and 2018/2019 in the Nursery and Laboratory of Ornamental Plants, Faculty of Agriculture, Minia University to study the effect of compost (7.5, 10.0 and 12.5 ton/fed) and seven treatments of stimulatory substances i.e. control, seaweeds extract (300 ppm), amino acids (200 ppm), ascorbic acid (100 ppm), salicylic acid (50 ppm), active yeast (5 g/l) and Minia azotein (50 ml/plant), as well as, their interaction on corms and cormels productivity of gladiolus and some chemical composition constituents. The obtained results indicated that the three levels of compost significantly increased corm diameter, number of cormels/plant, fresh weights/plant, as well as, chemical composition (photosynthetic pigments and N, P and K%) as compared to control. The maximum values were obtained by using compost at 12.5 ton/fed. Treated plants with any of six used stimulatory treatments considerably increased corm and cormels productivity and chlorophyll a, b and carotenoids content, as well as, the percentage of N, P and K in the leaves. Minia azotein was the most effective than the other treatments in this concern the interaction treatments were obtained due to fertilizing gladiolus with compost at 12.5 ton/fed and inoculation of the soil with either Minia azotein or with the sprayed plants with active yeast.

Key words: Gladiolus, compost, seaweeds extract, amino acids, ascorbic, salicylic, yeast and Minia azotein.

INTRODUCTION

Gladiolus grandiflorus cv. Eurovision has some important characters such as its favorable height (120 to 130 cm), sturdiness of stem is good with large florets size which are showy rose florets (7.5 to 8.5 cm). Besides, it can be bloomed in winter to early spring. The possibility of exporting of its flowers could be increased (Ahmed, 2013).

Corm and cormel traits i.e. corm diameter, fresh and dry weights of corm, cormels number, fresh and dry weights/cormel and number of contractile root per corm, as well as, the three

photosynthetic pigments (chlorophyll a, b and carotenoids contents) and of N, P and K % in the leaves and corms were increased due to fertilizing gladiolus plants with compost reported by Ruppenthal and Castro (2005), Chandar *et al.* (2012), Ahmed (2013), Abdou and Ibrahim (2015), Hassan (2016), Tirkey *et al.* (2017), Baruati *et al.* (2018); Beck *et al.* (2019), Karagöz *et al.* (2019) and Hassan and Abd El-Azeim (2020).

The impact of stimulatory substances on enhancing corms and cormels production, as well as, the photosynthetic pigments and some nutrients (N, P and K %) of gladiolus

plant was emphasized by Hassan (2016) on gladiolus plants regarding seaweeds extract; Abd El-Aziz *et al.* (2009), Sewedan *et al.* (2012) and Hashish *et al.* (2015), Hassan (2016) and Khattab *et al.* (2016) on gladiolus plants concerning amino acids; furthermore, Abd El-Aziz *et al.* (2009), Abo Leila and Eid (2011), Abdou and Ibrahim (2015), Khalil (2015), Ahmed (2019) and Abdou *et al.* (2019), on gladiolus, showed that all corm and cormels productivity were increased with ascorbic acid treatment; Sajjad *et al.* (2014), Padmalatha *et al.* (2014), Khalil (2015), Pawar *et al.* (2018), Tamrakar *et al.* (2018) and Hassan and Abd El-Azeim (2020) revealed that corms and cormels production of gladiolus were increased as a result of fertilizing plants with salicylic acid. Also, Fawzy *et al.* (2012), Ahmed (2013) and Abdou and Ibrahim (2015), on gladiolus, indicated that active yeast increased corm diameter and corm fresh and dry weights, number of cormels/plant and cormels fresh and dry weights, as well as N, P and K % Abdou *et al.* (2004), El-Sayed (2004) and El-Deeb (2016) on gladiolus plants concerning N-fixing bacteria.

Therefore, the present study aimed to investigate the effect of compost and some stimulatory substances on corm and cormels production, as well as, some chemical composition constituents of gladiolus cv. Eurovisin.

MATERIALS AND METHODS

The current study was carried out at the Nursery of Ornamental Plants, Faculty of Agriculture, Minia University during the two successive seasons of 2017/2018 and 2018/2019 to investigate the effect of compost, and some stimulatory substances, as well as, their interactions on corm and cormels production as well as some chemical composition constituents of gladiolus (*Gladiolus grandiflorus*, cv. Eurovision) plants.

The corms of *Gladiolus grandiflorus*, cv. Eurovision were obtained from Holland by Basiouny Nurseries, Cairo, Egypt. Average

corm diameter was 3.0 and 3.3 cm and average corm weight was 9.9 and 10.4 g for both seasons, respectively, corms were soaked in Pinlate at 1.0 g/l for one minute before planting in both seasons. The experiment was arranged in a randomized complete block design in a split plot design with three replicates. The main plot (A) included four levels of compost 0.0, 7.5, 10.0 and 12.5 ton/fed), while seven treatments of stimulatory substances occupied the sub-plot (B), namely, control, seaweeds extract (300 ppm), amino acids (200 ppm), ascorbic acid (100 ppm), salicylic acid (50 ppm), active yeast (5 g/l) and Minia azotein (50 ml/plant). Therefore, the interaction treatments (A x B) were 28 treatments. The experimental unit (plot) was 1.5 x 1.8 m containing 3 ridges, 50 cm apart. Corms were planted on September 1st for both seasons in hills, 15 cm apart (12 corms/ridge). The physical and chemical analyses of the used soil in both seasons were determined according to Page *et al.* (1982) and shown in Table (a).

Compost (plant residues) was obtained from Egypt Company for Circulate Solid Residues at El-Minia New City and added during preparing the soil to cultivation in both seasons. The chemical analysis of compost is shown in Table (b).

Minia azotein (containing N-fixing bacteria) was obtained from the Laboratory of Bio-fertilizers, Genetic Department, Faculty of Agriculture, Minia University. It was applied at 50 ml/plant three times to the soil around each plant, one month and two months from planting date, and after flowers cut.

The dry matter of yeast (*Saccharomyces cerevisia*), was 95% and live cells were 11.6×10^9 /g. The yeast suspension was prepared by dissolving dry yeast and sugar together (ratio of 1:1, w/w basic) in warm water (38 °C) and let it to stand for two hours before spraying to enhance yeast activity (Skoog and Miller, 1957), chemical analysis of the dry yeast is presented in Table (c).

Table a. Physical and chemical properties of the used soil during the two seasons of 2017/2018 and 2018/2019.

Soil character	Values		Soil character	Values	
	2017/2018	2018/2019		2017/2018	2018/2019
Physical properties			Exchangeable nutrients		
Sand (%)	28.98	28.90	Ca ⁺⁺ (mg/100 g soil)	31.12	31.43
Silt (%)	29.87	30.64	Mg ⁺⁺ (mg/100 g soil)	3.51	3.56
Clay (%)	41.15	40.46	Na ⁺ (mg/100 g soil)	2.51	2.50
Soil type	Clay loam	Clay loam	K ⁺ (mg/100 g soil)	2.85	2.64
Chemical properties			DTPA-Extractable nutrients		
pH (1:2.5)	7.75	7.71	Fe (ppm)	8.23	8.11
E.C. (dS/m)	1.08	1.06	Cu (ppm)	2.01	2.00
O.M.	1.54	1.59	Zn (ppm)	2.87	2.89
CaCO ₃	2.11	2.10	Mn (ppm)	8.11	8.15

Table b. Chemical analysis of the used compost in both seasons of 2017/2018 and 2018/2019.

Properties	Values	Properties	Values
Organic carbon (%)	25.1	Total P (%)	0.5
Humidity (%)	25.0	Total K (%)	1.0
Organic matter	44.0	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.)	5.0	Cu (ppm)	200
Total N (%)	1.5		

Table c. Chemical analysis of the used active dry yeast in both seasons of 2017/2018 and 2018/2019.

Protein (%)	Ash (%)	Glycogen (%)	Fat (%)	Cellulose (%)
34.87	7.55	6.54	2.09	4.92

Algeser product contains seaweeds extract, which was obtained from Shoura Chemical Company, Cairo-Alexandria Desert Road, Giza Governorate, Egypt. The chemical properties of the used seaweeds extract were listed in Table (d).

Aminoactal product contains a mixture of three amino acids (treptophan, methionine and cysteine), which was obtained from Shoura Chemical Company, Cairo-Alexandria Desert Road, Giza Governorate, Egypt.

The seaweeds extract, amino acids, ascorbic acid, salicylic acid and yeast were applied by hand spraying till run off, three times on the same schedule of Minia azotein bio-fertilizer. The agricultural practices were performed as usual in the cultivation region.

The following data were recorded:

1. Under ground parts: As flowering diminished, under ground parts were lift 2

months after cut spikes. Under ground parts characters at harvesting, after the foliage were dried, data recorded were: corms diameter (cm), number of cormels/plant and fresh weight of cormels/plant (g).

2. Chemical analysis: determination of three photosynthetic pigments (chlorophyll a, b and carotenoids content as mg/g f.w.) according to Moran (1982), as well as, N, P and K% as methods described by Wilde *et al.* (1985), Chapman and Pratt (1975) and Cottenie *et al.* (1982), respectively.

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

Table d. Chemical properties of the used seaweeds extract in both seasons of 2017/2018 and 2018/2019.

Character	Value	Character	Value	Character	Value
Moisture %	6.0	P %	0.02-0.09	Zn ppm	10-00
Organic matter %	45-60	K %	1.0-1.2	B ppm	20-100
Inorganic matter %	45-60	Ca %	0.2-1.5	Mo ppm	1-5
Protein %	6-8	S %	3-9	Cytokinins %	0.02
Carbohydrate %	35-50	Mg %	0.5-0.9	IAA %	0.03
Aliginic acids %	10-20	Cu ppm	1.0-6.0	ABA %	0.01
Mannitol %	4-7	Fe ppm	50-200		
Total N %	1.0-1.5	Mn ppm	5-12		

RESULTS AND DISCUSSION

Corm and cormels productivity:

Data presented in Table (1) showed that the corm diameter, number of cormels/plant and fresh weight of cormels/plant were significantly increased due to the fertilizing gladiolus with compost at 7.5, 10.0 and 12.5 t/fed compared with control. The highest values were obtained as recorded 3.75 and 3.73 cm, and 71.8 and 73.3 cormels/plant, and 79.41 and 81.34 g f.w./plant in the first and second season, respectively. Similar results were investigated by Ruppenthal and Castro (2005), Ahmed (2013), Abdou and Ibrahim (2015), Beck *et al.* (2019), Karagöz *et al.* (2019) and Hassan and Abd El-Azeim (2020) on gladiolus plants.

Regarding the sub-plot treatments, using any one of the six treatments significantly increased corms diameter, number of cormels/plant and fresh weight of cormels/plant, in both seasons, as compared to control. Minia azotein treatment produced the widest corm diameter (3.35 and 3.61 cm), highest number of cormels/plant (70.6 and 72.5 cormels/plant) and heaviest fresh weight (77.63 and 79.13 g f.w.) in both seasons respectively. Similar observation was pointed out by Abdou *et al.* (2004), Taha and Hassan (2008), Bazaraa *et al.* (2011), and Baruati (2018), on gladiolus plants, regarding the effect of biofertilizers, while, Ahmed (2013), Abdou and Ibrahim (2015), on gladiolus, concerning the effect of active yeast. Also, Abd El-Aziz *et al.* (2009), Sewedan *et al.* (2012) and Hashish *et al.* (2015), Hassan (2016) and Khattab *et al.* (2016) indicated that amino acids improved

corm and cormels production of gladiolus, moreover, Hassan (2016), on gladiolus, found that seaweeds extract increased new corm diameter and cormels weight per plant. Meanwhile, Khalil (2015) concluded that antioxidant treatments (ascorbic and/or salicylic acid) caused enhancement of corms and cormels productivity of gladiolus plants.

The interaction between the main and sub-plots (A x B) was significant for all studied parameters of corm and cormels productivity in both seasons. The maximum values were recorded due to the interaction treatments of compost at 12.5 t/fed in combination with Minia azotein or by 12.5 t/fed compost with active yeast.

Similarly, were the results Ahmed (2019) on gladiolus, regarding the best interaction between compost and amino acid, and Ahmed (2013) on gladiolus, concerning the effect of interaction between compost and active yeast.

Chemical composition:

1. Photosynthetic pigments:

Data presented in Table (2) indicated that supplying plants with compost at 7.5, 10.0 and 12.5 t/fed led to significant increases in photosynthetic pigments i.e. chlorophyll a, b and carotenoids, in both seasons, as compared to control. The treatment of 12.5 t/fed compost was the most effective than the other treatments as gave 2.162 mg/g f.w chlorophyll a, 1.223 mg/g f.w chlorophyll b and 1.631 mg/g f.w carotenoids in the first season against control (1.025, 0.331 and 1.172, respectively). In the second season, such superior treatment

Table 1. Effect of compost, some stimulatory substances and their combination on corm diameter, number of cormels/plant and fresh weight of cormels/plant of gladiolus cv. Eurovisin during 2017/2018 and 2018/2019 seasons.

Stimulatory substances treatment (B)	Compost levels (ton/feddan) (A)										
	0	7.5	10.0	12.5	Mean (B)	0	7.5	10.0	12/5	Mean (B)	
	The 1 st season (2017/2018)					The 2 nd season (2018/2019)					
	Corms diameter (cm)										
Control	2.37	2.93	3.21	3.58	3.02	3.00	3.13	3.32	3.53	3.24	
Seaweed extract, 300 ppm	2.47	3.17	3.33	3.73	3.18	3.18	3.30	3.50	3.71	3.42	
Amino acids, 200 ppm	2.57	3.29	3.40	3.89	3.29	3.28	3.42	3.64	3.87	3.55	
Ascorbic acids, 100 ppm	2.47	3.08	3.25	3.62	3.11	3.05	3.17	3.37	3.58	3.29	
Salicylic acids, 100 ppm	2.41	3.11	3.26	3.66	3.11	3.11	3.23	3.43	3.64	3.35	
Active yeast, 5 g/l	2.52	3.23	3.40	3.81	3.24	3.24	3.37	3.58	3.80	3.50	
Minia azotein, 50 ml	2.62	3.34	3.45	3.97	3.35	3.93	3.48	3.71	3.95	3.61	
Mean (A)	2.48	3.16	3.33	3.75	2.48	3.17	3.30	3.51	3.73		
L.S.D. at 5 %	A: 0.16		B: 0.08		AB: 0.16		A: 0.19		B: 0.11		AB: 0.22
	Number of cormels/plant										
Control	34.1	38.0	50.2	54.2	44.2	34.5	42.1	53.1	56.3	46.5	
Seaweed extract, 300 ppm	44.2	51.2	65.4	71.6	58.1	46.4	56.5	69.9	73.6	61.6	
Amino acids, 200 ppm	49.4	58.4	74.6	82.7	66.3	51.6	65.6	74.9	83.9	69.0	
Ascorbic acids, 100 ppm	39.1	44.0	56.3	60.8	50.1	40.3	48.3	59.8	62.5	52.7	
Salicylic acids, 100 ppm	42.1	48.1	61.4	66.7	54.6	44.3	53.4	65.9	68.5	58.0	
Active yeast, 5 g/l	47.3	55.3	70.5	77.6	62.7	49.5	59.5	73.8	78.8	65.4	
Minia azotein, 50 ml	51.3	62.5	79.7	88.8	70.6	53.6	66.1	80.5	89.8	72.5	
Mean (A)	43.9	51.1	66.4	71.8		45.7	55.9	68.3	73.3		
L.S.D. at 5 %	A: 6.0		B: 12.0		AB: N.S		A: 5.0		B: 7.2		AB: 14.2
	Fresh weight of cormels/plant (g)										
Control	37.51	41.80	55.22	59.62	48.54	38.30	46.73	59.94	62.47	51.62	
Seaweed extract, 300 ppm	49.06	56.83	72.59	79.48	64.47	51.55	62.77	77.66	81.77	68.44	
Amino acids, 200 ppm	54.44	64.33	82.10	90.90	72.94	56.77	72.11	82.40	92.30	75.90	
Ascorbic acids, 100 ppm	43.79	49.28	63.06	68.10	56.06	44.81	53.71	66.50	69.50	58.63	
Salicylic acids, 100 ppm	47.15	49.22	68.77	74.70	59.96	49.26	59.38	73.28	76.18	64.53	
Active yeast, 5 g/l	52.03	61.38	77.55	85.36	69.08	52.03	65.45	81.92	87.07	71.72	
Minia azotein, 50 ml	56.43	63.75	87.67	97.68	77.63	58.43	68.75	89.67	99.68	79.13	
Mean (A)	48.62	55.94	72.42	79.41		50.16	61.27	75.76	81.34		
L.S.D. at 5 %	A: 5.32		B: 8.45		AB: 0.22		A: 5.48		B: 7.44		AB: 14.88

Table 2. Effect of compost, some stimulatory substances and their combination on chlorophyll a, b and carotenoids of gladiolus cv. Eurovisin during 2017/2018 and 2018/2019 seasons.

Stimulatory substances Treatment (B)	Compost levels (ton/feddan) (A)										
	0	7.5	10.0	12.5	Mean (B)	0	7.5	10.0	12/5	Mean (B)	
	The 1 st season (2017/2018)					The 2 nd season (2018/2019)					
Chlorophyll a (mg/g f.w.)											
Control	0.571	0.981	1.210	1.933	1.173	0.620	0.952	1.388	2.120	1.270	
Seaweed extract, 300 ppm	0.688	2.103	2.207	2.250	1.812	0.775	1.234	2.147	2.229	1.596	
Amino acids, 200 ppm	1.776	1.850	2.028	2.319	2.065	2.010	2.234	2.235	2.243	2.180	
Ascorbic acids, 100 ppm	0.493	0.956	1.435	2.121	1.251	0.663	1.159	1.680	1.737	1.309	
Salicylic acids, 100 ppm	0.754	1.132	1.281	2.194	1.340	1.026	1.055	1.544	2.207	1.458	
Active yeast, 5 g/l	1.583	1.757	1.979	2.154	1.868	1.160	1.673	1.926	2.238	1.749	
Minia azotein, 50 ml	1.312	1.360	2.152	2.166	1.747	1.267	1.280	1.643	1.802	1.498	
Mean (A)	1.025	1.448	1.756	2.162		1.074	1.369	1.794	2.082		
L.S.D. at 5 %	A: 0.101		B: 0.075		AB: 0.15		A: 0.123		B: 0.039		AB: N.S
Chlorophyll b (mg/g f.w.)											
Control	0.278	0.433	0.519	0.904	0.533	0.309	0.513	0.732	0.769	0.580	
Seaweed extract, 300 ppm	0.550	0.574	1.135	1.138	0.849	0.517	0.537	0.720	1.719	0.873	
Amino acids, 200 ppm	0.336	1.017	1.301	1.801	1.113	0.694	1.532	1.637	2.014	1.469	
Ascorbic acids, 100 ppm	0.237	0.416	0.756	0.813	0.555	0.425	0.569	0.625	1.072	0.672	
Salicylic acids, 100 ppm	0.234	0.410	0.602	1.070	0.580	0.468	0.479	0.686	1.311	0.736	
Active yeast, 5 g/l	0.338	0.935	1.213	1.587	1.018	0.542	0.700	0.831	1.778	0.962	
Minia azotein, 50 ml	0.349	0.475	0.523	1.251	0.649	0.355	0.525	1.109	1.489	0.869	
Mean (A)	0.331	0.608	0.865	1.223		0.472	0.623	0.905	1.500		
L.S.D. at 5 %	A: 0.052		B: 0.021		AB: 0.042		A: 0.061		B: 0.033		AB: 0.066
Carotenoids (mg/g f.w.)											
Control	0.699	1.331	1.588	1.589	1.301	1.171	1.458	1.546	1.585	1.440	
Seaweed extract, 300 ppm	1.317	1.541	1.543	1.585	1.496	1.488	1.538	1.539	1.583	1.537	
Amino acids, 200 ppm	1.552	1.575	1.585	1.587	1.574	1.587	1.587	1.589	1.589	1.588	
Ascorbic acids, 100 ppm	0.974	1.493	1.560	1.590	1.404	1.388	1.543	1.582	1.582	1.522	
Salicylic acids, 100 ppm	1.224	1.452	1.583	1.587	1.461	1.457	1.476	1.586	1.586	1.525	
Active yeast, 5 g/l	1.238	1.588	1.589	1.589	1.510	1.532	1.573	1.590	1.590	1.570	
Minia azotein, 50 ml	1.199	1.537	1.553	1.581	1.467	1.379	1.560	1.589	1.589	1.528	
Mean (A)	1.172	1.502	1.571	1.631		1.428	1.533	1.572	1.586		
L.S.D. at 5 %	A: 0.063		B: 0.088		AB: N.S		A: 0.038		B: 0.053		AB: N.S

recorded 2.082 mg/g f.w. chlorophyll a, 1.500 mg/g f.w. chlorophyll b and 1.586 mg/g f.w. carotenoids against 1.074, 0.472 and 1.428 mg/g f.w. respectively, for control.

These results are in agreement with those obtained by Abdou *et al.* (2013), Khalil (2015), Abdou *et al.* (2018) and Hassan and Abd El-Azeim (2020) on gladiolus plants and Mirkalae *et al.* (2013) on Easter lily plants.

Regarding the effect of sub plot treatments, data presented in Table (2) showed that all the used six treatments significantly increased chlorophyll a, b and carotenoids content comparing with control. Among the used six treatments, amino acids treatment overall significantly increased the three photosynthetic pigments in both seasons. Active yeast came in the second place, while, ascorbic acid gave the lowest values regardless the control. Other treatments recorded an intermediate value.

Many authors concluded that amino acids enhanced chlorophyll, such as, Abd El-Aziz *et al.* (2009), Sewedan *et al.* (2012) and Hassan (2016) on gladiolus plants also, Ahmed (2013), on gladiolus, reported that the photosynthetic pigments were increased with active yeast. The stimulatory effect of biofertilizers on photosynthetic pigments was observed by El-Sayed (2004) and Hassan and Abd El-Azeim (2020). Hassan (2016), on gladiolus plants, mentioned that seaweed treatment increased photosynthetic pigments. Moreover, antioxidant treatments improved pigments of gladiolus (Sajjad *et al.*, 2014 and Khalil, 2015, regarding salicylic acid and Khalil, 2015 and Abdou *et al.*, 2019, concerning ascorbic acid).

The interaction was significant for chlorophyll a in the first season and chlorophyll b in both seasons, as well as, not significant in both seasons for carotenoids. The highest values were obtained by using compost at 12.5 t/fed in combination with either amino acids or active yeast.

2. N, P and K %:

Data presented in Table (3) indicated that the percentages of N, P and K were significantly increased due to fertilizing gladiolus plants with compost (7.5, 10.0 and 12.5 t/fed) in both seasons, compared to control. Compost at 12.5 t/fed resulted the highest percentages as gave 1.921, 0.374 and 1.185 in the first season and 2.030, 0.381 and 1.181 in the second one, respectively, due to N, P and K%.

Similar results were obtained by Abdou *et al.* (2013), Khalil (2015), Hassan (2016), Abdou *et al.* (2018) and Hassan and Abd El-Azeim (2020) on gladiolus plants.

Regarding the effect of stimulatory substances (seaweeds extract, amino acids, ascorbic acid, salicylic acid, active yeast and Minia azotein), data presented in Table (3) showed that all the used six treatments significantly increased N, P and K % in the dry leaves in both seasons comparing with control. Minia azotein treatment was the most effective than the other used treatments in this concern.

Many authors evaluated the effect of biofertilizer such as, El-Sayed (2004), Taha and Hassan (2008), Abdou and Ibrahim (2015), Mazhar and Eid (2016), Sathyanarayana *et al.* (2018) and Hassan and Abd El-Azeim (2020) on gladiolus and Attia *et al.*, (2018) on tuberose plants.

Hassan (2016) on gladiolus and Afifpour and Kosh-Khui (2015) on *Polianthes tuberosa* found that amino acids have positive effect on N, P and K %. Moreover, Ahmed (2013) on gladiolus mentioned that active yeast increased N, P and K %. However, Sajjad *et al.* (2014), Khalil (2015), Abdou *et al.* (2018) concluded that salicylic acid increased N, P and K%, while Khalil (2015), Abdou and Ibrahim (2015) and Abdou *et al.* (2019) on gladiolus concluded that ascorbic acid have positive effects on N, P and K %.

The interaction was significant for N and P % in both seasons. The best interaction

Table 3. Effect of compost, some stimulatory substances and their combination on nitrogen, phosphorus and potassium percentages of gladiolus cv. Eurovisin during 2017/2018 and 2018/2019 seasons.

Stimulatory substances Treatment (B)	Compost levels (ton/feddan) (A)										
	0	7.5	10.0	12.5	Mean (B)	0	7.5	10.0	12/5	Mean (B)	
	The 1 st season (2017/2018)					The 2 nd season (2018/2019)					
	Nitrogen (%)										
Control	1.531	1.622	1.755	1.841	1.687	1.552	1.643	1.776	1.863	1.709	
Seaweed extract, 300 ppm	1.651	1.746	1.875	1.960	1.808	1.700	1.795	1.925	2.011	1.858	
Amino acids, 200 ppm	1.762	1.856	1.986	2.072	1.920	1.833	1.926	2.056	2.145	1.990	
Ascorbic acids, 100 ppm	1.582	1.675	1.806	1.890	1.738	1.612	1.706	1.835	1.920	1.768	
Salicylic acids, 100 ppm	1.611	1.706	1.835	1.920	1.768	1.651	1.745	1.876	1.961	1.808	
Active yeast, 5 g/l	1.708	1.795	1.925	2.011	1.858	1.763	1.855	1.985	2.072	1.919	
Minia azotein, 50 ml	1.843	1.937	2.068	2.155	2.001	1.923	2.018	2.148	2.236	2.081	
Mean (A)	1.669	1.762	1.893	1.921		1.719	1.813	1.943	2.030		
L.S.D. at 5 %	A: 0.025		B: 0.041		AB: 0.082		A: 0.031		B: 0.044		AB: 0.088
	Phosphorus (%)										
Control	0.211	0.243	0.274	0.302	0.258	0.222	0.256	0.285	0.313	0.269	
Seaweed extract, 300 ppm	0.293	0.324	0.355	0.380	0.338	0.300	0.331	0.360	0.393	0.346	
Amino acids, 200 ppm	0.312	0.341	0.376	0.410	0.360	0.315	0.352	0.382	0.411	0.365	
Ascorbic acids, 100 ppm	0.251	0.283	0.311	0.341	0.298	0.260	0.291	0.322	0.351	0.306	
Salicylic acids, 100 ppm	0.272	0.301	0.332	0.361	0.317	0.281	0.311	0.341	0.372	0.326	
Active yeast, 5 g/l	0.301	0.331	0.365	0.400	0.349	0.310	0.341	0.371	0.401	0.356	
Minia azotein, 50 ml	0.325	0.353	0.387	0.426	0.373	0.324	0.361	0.395	0.427	0.377	
Mean (A)	0.281	0.311	0.343	0.374		0.287	0.320	0.351	0.381		
L.S.D. at 5 %	A: 0.011		B: 0.009		AB: 0.018		A: 0.015		B: 0.010		AB: 0.020
	Potassium (%)										
Control	1.111	1.123	1.132	1.138	1.126	1.117	1.126	1.135	1.140	1.130	
Seaweed extract, 300 ppm	1.147	1.169	1.179	1.181	1.169	1.143	1.160	1.171	1.177	1.163	
Amino acids, 200 ppm	1.166	1.189	1.196	1.201	1.188	1.165	1.183	1.195	1.199	1.186	
Ascorbic acids, 100 ppm	1.136	1.154	1.164	1.166	1.155	1.139	1.156	1.168	1.178	1.160	
Salicylic acids, 100 ppm	1.125	1.143	1.153	1.155	1.144	1.128	1.145	1.156	1.162	1.148	
Active yeast, 5 g/l	1.155	1.178	1.185	1.190	1.177	1.154	1.170	1.182	1.189	1.174	
Minia azotein, 50 ml	1.169	1.199	1.210	1.221	1.200	1.174	1.194	1.215	1.229	1.201	
Mean (A)	1.144	1.165	1.174	1.185		1.146	1.162	1.175	1.181		
L.S.D. at 5 %	A: 0.011		B: 0.008		AB: N.S		A: 0.013		B: 0.009		AB: N.S

treatment was 12.5 ton/fed compost in combination with Minia azotein.

CONCLUSION

It could be recommended from our results that to obtain the best production of gladiolus corm and cormels characters, it should be fertilized with compost at 12.5 ton/fed and inoculation the soil of gladiolus with Minia azotein (50 ml/plant) or spraying plants with amino acids (200 ppm).

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تأثير الكمبوست وبعض المواد المنشطة على نبات الجلاديولس ب. إنتاجية الكورمات والكريمات وبعض المكونات الكيماوية

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أجريت تجربة حقلية في موسمي ٢٠١٧/٢٠١٨ و ٢٠١٨/٢٠١٩ بمشتل ومعمل نباتات الزينة، كلية الزراعة، جامعة المنيا لدراسة تأثير الكمبوست (٠،٠، ٧،٥، ١٠،٠، ١٢،٥ طن/فدان) والمواد المنشطة للنمو (الكنترول، مستخلص أعشاب البحر [٣٠٠ جزء في المليون]، الأحماض الأمينية [٢٠٠ جزء في المليون]، حمض الأسكوربيك [١٠٠ جزء في المليون]، حمض الساليسيلك [٥٠ جزء في المليون]، الخميرة النشطة [٥ جم/لتر]، المنيا أزوتين [٥٠ مل/نبات]) وكذلك التفاعل بينهما علي إنتاجية الكورمات والكريمات لنبات الجلاديولس وبعض المكونات الكيماوية. أشارت النتائج إلى أن الثلاث مستويات من الكمبوست أدت إلي زيادة معنوية في صفات فُطر الكورمة وعدد الكريمات للنبات والوزن الطازج والجاف للكريمات بالإضافة إلى صبغات البناء الضوئي والنسبة المئوية للنيتروجين والفسفور والبوتاسيوم مقارنة بالكنترول. وكانت أفضل النتائج عند استخدام معدل ١٢،٥ طن/فدان من الكمبوست. معاملة النباتات بكل المعاملات السيت المستخدمة زادت معنوياً إنتاجية الكورمات والكريمات وكلوروفيل أ، ب والكاروتينويدات بالإضافة إلي النسب المئوية للعناصر ن، فو، بو مقارنة بالكنترول. وكان المنيا أزوتين أكثر كفاءة من المعاملات الأخرى في هذا الصدد. أفضل معاملات التفاعل تم الحصول عليها من النباتات المُسمّدة بالكمبوست ١٢،٥ طن/فدان مع حقن تربة النبات ب المنيا أزوتين أو مع رشها بالأحماض الامينية.