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EFFECT OF FOLIAR APPLIED BENZYLADENINE AND GIBBERELLIC ACID ON VEGETATIVE GROWTH AND CHEMICAL CONSTITUENTS OF *Dracaena marginata*. I- Unpinched plants.

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ABSTRACT

This study, aimed to test the effect of applying foliar sprays of gibberellic acid and benzyladenine in increasing the quality and performance of *Dracaena marginata* plants. The study was carried-out at Antoniades Research Branch, Horticulture Research Institute, A.R.C. Alexandria, Egypt, during the two successive seasons of 2013 and 2014. Dracaena seedlings were planted individually in plastic pots 30 cm diameter. The plants were sprayed with gibberellic acid at the concentrations of 500, 1000 and 1500 ppm and benzyladenine at the concentrations of 200, 250 and 300 ppm.

The obtained results showed that spraying with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together significantly increased plant height, the number of leaves per plant, leaf dry weight, leaf area, stem diameter, stem dry weight, the number of branches per plant, root length and root dry weight. The obtained results showed that spraying with gibberellic acid at 1000 ppm and benzyladenine at 250 ppm together resulted in the highest chlorophyll content, carbohydrate contents and nitrogen percentage in the leaves.

Key words: *Dracaena marginata, gibberellic acid, benzyladenine.*

1. INTRODUCTION

The genus *Dracaena* belongs to the botanical family Ruscaceae. Its center of origin is located in tropical and subtropical regions of Africa, Asia and Australia. This genus comprises about 40 species (Bailey and Bailey, 1976), but only six species *D. deremensis*, *D. fragrans*, *D. marginata*, *D. reflex*, *D. sanderiana*, and *D. surculosa* (godseffiana) are cultivated as foliage plants. These species are favored as interior ornamental plants because of their diverse shapes, colors and forms available in the market and because of their ability to survive under low-light conditions with minimum care (Chen *et al.*, 2002).

Cytokinins are important plant hormones that regulate various processes of plant growth and development. Cytokinins appear to play an important role in the regulation of cell division, differentiation and organogenesis in developing plants, enhancement of leaf expansion, nutrient mobilization and delayed senescence, (Skoog and Armstrong 1970; Hall, 1973. Shudok (1994), reported that the chemical structure of cytokinin active substances has determined two groups of adenine cytokinins and urea cytokinins with similar physiological effects. It has pronounced effect on cotyledon growth and expansion and other processes. The effect of cytokinins especially benzyladenine on the plant growth and chemical constituents of different plants was reported by Eraki *et al*. (1993) on Saliva plants, Mazrou (1992) on Datura, Mazrou *et al*. (1994) on sweet basil, Mansour *et al.* (1994) on soybean plants and Vijayakumari (2003) on *Andrographis panculata*. The simulative response of gibberellic acid, which is known to be one of the endogenous growth regulators, could be attributed to its unique roles in plant growth and development as reported by many investigators. Leopold and Kriedmann (1975) suggested that GA_3 has the capability of modifying the growth pattern of treated plants by affecting the DNA and RNA levels, cell division and expansion, biosynthesis of enzymes, proteins, carbohydrates and photosynthetic pigments. The beneficial effects of gibberellic acid on different plants were recorded by Shedeed *et al*. (1991) on croton plant, Abou-Leila *et al*. (1994) on *Ocimum basillicum* and,

Eraki (1994) on Queen Elizabeth rose plants, Ibrahim (2005) on Jojoba, who concluded that gibberellic acid is used to regulate plant growth through increasing cell division and cell elongation.

The aim of this research was to study some important traits of unpinched *Dracaena marginata* plants treated with gibberellic acid and benzyladenine as foliar application and the explore the effect of these applications on maintenance of interior landscape plants with desirable quality and marketing.

2. MATERIALS AND METHODS

The present study was carried-out at Antoniades Research Branch, Horticulture Research Institute, A.R.C. Alexandria, Egypt during the two successive seasons of 2013 and 2014. The aim was to investigate the effect of applying foliar sprays of gibberellic acid and benzyladenine on increasing the quality and performance of *Dracaena marginata* plants.

On the 10th of March, 2013 and 2014 (in the first and second seasons, respectively) homogenous seedlings of *Dracaena marginata* (34-36 cm height and 18-22 leaf per plant in average) were planted individually in plastic pots (30 cm diameter) filled with 10 kg mixture of sand and clay at the ratio of (1:1 by volume). The chemical constituents of the soil were measured as described by Jackson (1958) and are illustrated in Table (1). On the 10th of April (in both seasons), the plants were sprayed with gibberellic acid at the concentrations of 500, 1000 and 1500 ppm and benzyladenine at the concentrations of 200, 250 and 300 ppm and the interaction between them, every 30 days starting from on the 10th of April till the 10th of July in both seasons. The control plants were sprayed with tap water. On the 10th of August in both seasons the plants were harvested.

In both seasons, all the plants received NPK chemical fertilization using fertilizer (Milagro Aminoleaf 20-20-20) at the rate of 2.0 g per pot. Fertilization was repeated every 30 days throughout the growing season (from the 20th of March till the 20th of July). In addition, the weeds were removed manually upon emergence.

Data were recorded as follows

1- Vegetative growth parameters: Plant height (cm), leaf number per plant, dry weight of leaves (g), leaf area (cm^2), stem diameter (cm), dry weight of stem (g), branches number per plant, root length (cm) and dry weight of roots (g).

2- Chemical analysis determination :

- Total chlorophylls content were determined according to Moran and Porath (1980).
- Total carbohydrate contents of the leaves were determined according to Dubios *et al.* (1956).
- Nitrogen (%) was determined in the digested solution by the modified micro Kjeldahl method as described by Pregl (1945).

The experimental design was a complete randomized block design (RCBD) contained 16 treatments with three replicates; each replicate contained three plants. Data were subjected to analysis of variance (ANOVA) using the SAS program, SAS Institute (Snedecor and Cochran, 1974) and the mean values were compared using L.S.D test at 5% level (SAS Institute, 2002).

Table (1): Chemical analysis of the used mixture soil for the two successive seasons 2013 and 2014.

Season	pH	EC (dSm^{-1})	Soluble cations (mg/l)				Soluble anions (mg/l)		
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	HCO_3^{-}	Cl^{-}	SO_4^{--}
2013	8.24	1.80	1.7	0.9	1.6	0.65	1.3	1.38	1.10
2014	8.08	1.61	1.3	0.6	1.4	0.53	1.0	1.13	0.98

3. RESULTS AND DISCUSSION

3.1. Vegetative growth

3.1.1. Plant height (cm)

The data in Table (2) indicate that gibberellic acid and benzyladenine treatments had a significant effect on the plant height. In both seasons, the plants sprayed with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together gave the tallest plant height compared to the control plants. As with other vegetative characteristics parameters, spraying the plants with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together gave the tallest stem length 55.83 and 57.66 cm in the first and second seasons, respectively. Similar increase in the plant height as a result of gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together treatments was recorded by Shedeed *et al.* (1991) on croton plants, Ibrahim (2005) on Jojoba plants, Eid and Abou-Leila (2006) on croton plants and Ibrahim *et al.* (2010)

on croton plants. Gibberellic acid is used to regulate plant growth through increased meristimatic activity due to enhanced cell division and elongation (Bhattuchajee *et al.,* (2002) on *Corchourus olitorius* L.). Gibberellic acid effected cellular processes such as cellular division stimulation, lengthening cells caused to increase vegetative growth (Stuart and Jones, 1977). Gibberellic acid increased tension of cellular wall, i.e. wall extension though hydrolysis of starch to sugar that follows decrease of potential of cellular water, cause to enter water inside cell and lengthen cell (Arteca, 1996).

3.1.2. Number of leaves per plant

The data presented in Table (2) show that, the different gibberellic acid and benzyladenine treatments had a significant effect on the number of leaves per plant of *Dracaena marginata*. The plants sprayed with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together significantly formed more leaves with a mean leaf number of 52.66 and 52.16 in the first and second seasons, respectively. On the other hand, the control plants gave the lowest number of leaves per plant 37.83 and 32.00 in the first and second seasons, respectively. These results may be due to the stimulatory effect of benzyladenine on increasing the number of leaves per plant. The increase in the number of leaves of plants sprayed with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm supports the results reported by Shedeed *et al.* (1991) on croton, Ibrahim (2005) on Jojoba plants, Eid and Abou-Leila (2006) and Ibrahim *et al.* (2010) on croton plants. Spraying solution of *Zantedeschia aethiopica* caused an increase in the number of leaves (Majidian *et al.,* 2012). Stimulation of sucrose synthesis and transferring of it to filter vessel in effect of application of gibberellic acid not only causes to increase growth in aerial parts of a plant that are discussed as consumption place. It can be concluded that variability of growth rate by gibberellic acid may be stimulation of photosynthesis rate, increase of activity of some enzyme or change in distribution of photosynthesis materials and or participative effect of these cases, due to an increase in effective level of leaf (Arteca, 1996 Aggarwal and Sachar., 1995).

3.1.3. Leaves dry weight (g) per plant

The data presented in Table (2) also show that spraying *Dracaena marginata* plants with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together significantly increased the dry weight of leaves giving values of 17.27 and 18.94 g per plant in the first and second seasons, respectively, compared to the control (9.34 and 9.29 g per plant in the first and second seasons, respectively). Accordingly, it can be seen from the data in Table (2) that *Dracaena marginata* plants sprayed with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together significantly increased leaves dry weight than plants sprayed with any other concentrations. These results are associated with the stimulatory effect of gibberellic acid on raising dry weight of leaves. In this respect Halter *et al.* (2005) mentioned that the leaf area was higher in artichoke plants treated with gibberellic acid. The increases in leaves dry weight of *Dracaena marginata* plants as a result of spraying with gibberellic acid and benzyladenine are similar to the increases in height that had been recorded on other ornamental plant species, by Shedeed *et al.* (1991) on croton plants, Ibrahim (2005) on Jojoba plants, Eid and Abou-Leila (2006) on croton plants and Ibrahim *et al.* (2010) on croton plants. The effect of gibberellic acid on increasing the rate of dry material of plants can be attributed to its effect on increasing photosynthesis rate through increasing leaf surface (Lester *et al*, 2002).

3.1.4. Leaf area (cm^2)

The data presented in Table (2) show that, the different gibberellic acid and benzyladenine treatments had a significant effect on leaf area of *Dracaena marginata* plants. Plants sprayed using gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together formed significantly larger leaves (with a mean area of 2354.75 and 2321.50 cm^2 in the first and second seasons, respectively, than those formed by control plants (1035.66 and 10.27.00 cm^2), Similar increases in leaf area as a result of gibberellic acid and benzyladenine treatments have been reported by Shedeed *et al.* (1991) on croton plants, Ibrahim (2005) on Jojoba plants, Eid and Abou-Leila (2006) and Ibrahim *et al.* (2010) on croton plants. In this respect Halter *et al.* (2005) mentioned that the leaf area was higher in artichoke plants treated with gibberellic acid.

3.1. 5. Stem diameter (cm)

The data recorded in Table (3) showed that spraying *Dracaena marginata* plants with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together gave the largest stem diameter 1.44 and 1.40 cm as compared with the control treatment which gave 1.08 and 1.11 cm

Table (2): Mean values of plant height, number of leaves, dry weight and area of leaves *Dracaena marginata* plants as influenced by gibberellic acid (GA_3) and benzyladenine (BA) in the two seasons of 2013 and 2014.

Treatments		Plant height (cm)		Number of leaves per plant		Dry weight of leaves (g)		Leaf area (cm^2)	
		2013	2014	2013	2014	2013	2014	2013	2014
Control		45.50	44.66	37.83	32.00	9.34	9.29	1035.66	1027.00
GA500		50.83	49.00	46.16	46.16	12.41	13.48	2002.70	1878.75
GA1000		51.16	49.33	46.66	46.66	13.88	14.28	2006.00	1940.75
GA1500		52.33	50.33	46.83	47.33	14.29	14.43	2074.50	2054.25
BA200		46.66	44.66	39.00	37.83	9.79	11.37	1348.54	1282.08
BA250		45.83	47.16	43.00	40.66	10.12	11.70	1381.04	1309.16
BA300		45.83	46.50	44.00	41.66	10.58	12.21	1533.12	1489.16
GA500	**BA200**	48.00	48.33	44.33	42.00	11.27	12.34	1657.91	1576.25
	BA250	49.00	48.50	44.33	43.66	11.50	12.46	1735.87	1581.87
	BA300	49.33	48.50	45.66	44.00	11.96	12.51	1763.12	1712.08
GA1000	**BA200**	52.83	51.16	51.50	49.83	16.54	15.33	2309.75	2287.25
	BA250	54.33	52.83	52.50	50.16	16.87	16.05	2313.25	2310.00
	BA300	55.83	57.66	52.66	52.16	17.27	18.94	2354.75	2321.50
GA1500	**BA200**	50.00	50.66	48.00	48.16	14.37	14.44	2139.00	2074.50
	BA250	51.16	50.83	50.33	48.66	14.97	14.65	2184.00	2184.00
	BA300	52.33	52.83	50.66	49.16	15.41	14.83	2287.25	2225.00
L.S.D. at 0.05		**6.59**	**5.48**	**7.84**	**9.42**	**5.34**	**4.69**	**364.84**	**375.33**

in the first and second seasons, respectively. The increase in the stem diameter due to spraying with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together supports the results reported by Ibrahim *et al.* (2010) on croton plants.

3.1.6. Dry weight of stem (g)

The data recorded in Table (3) showed that spraying *Dracaena marginata* plants with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together gave the heaviest values of stem dry weight: 6.75 and 6.28 g in the first and second seasons, respectively. Whereas, it was found that spraying with tap water (control) decreased the stem dry weight to 4.05 and 4.18 g as compared with the other treatments in the first and second seasons, respectively. The increase in stem dry weight due to spraying with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together supports the results reported by Shedeed *et al.* (1991) on croton plants, Ibrahim (2005) on Jojoba plants, Eid and Abou-Leila (2006) on croton plants and Ibrahim *et al.* (2010) on croton plants. The effect of gibberellic acid on increasing rate of dry material of plant can be attributed to its effect on increasing photosynthesis rate through increasing leaf surface (Lester *et al*, 2002).

3.1.7. Number of branches per plant

The data in Table (3) show that plants sprayed with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together formed the highest number of branches per plant which gave 2.50 and 2.66 branches in the first and second seasons, respectively. Whereas, control plants gave the lowest number of branches per plant and it was one branch in both seasons. The increase in the number of branches per plant due to spraying with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together supports the results reported by Shedeed *et al.* (1991) on croton plants, Ibrahim (2005) on Jojoba plants, Eid and Abou-Leila (2006) on croton plants and Ibrahim *et al.* (2010) on croton plants. Plant gibberellic acid is used to regulate plant growth through increased meristimatic activity and enhance cell division and elongation (Bhattuchajee *et al.* (2002) on *Corchourus olitorius* L.)

3.1.8. Root length (cm)

The data recorded in Table (4) showed that spraying *Dracaena marginata* plants with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together gave the tallest root length; 89.16 and 86.50 cm as compared with the control treatment which gave 72.66 and 66.00 cm in the first and second seasons, respectively. The increase in root length due to spraying with

Table (3): Means values of diameter, dry weight of stem and number of branches of *Dracaena marginata* plants as influenced by gibberellic acid (GA3)and benzyladenine (BA) in the two seasons of 2013 and 2014.

Treatments		Stem diameter (cm)		Dry weight of stem (g)		Number of branches per plant	
		2013	2014	2013	2014	2013	2014
Control		1.08	1.11	4.05	4.18	1.00	1.00
GA500		1.22	1.26	5.13	5.00	1.00	1.16
GA1000		1.25	1.27	5.45	5.15	1.00	1.16
GA1500		1.25	1.28	5.49	5.31	1.00	1.16
BA200		1.11	1.18	4.38	4.63	1.33	1.50
BA250		1.16	1.20	4.64	4.65	1.66	1.83
BA300		1.16	1.23	4.65	4.72	1.66	1.83
GA500	**BA200**	1.17	1.24	4.74	4.83	1.33	1.50
	BA250	1.20	1.25	4.80	4.94	1.50	1.66
	BA300	1.21	1.25	4.87	4.96	1.66	1.83
GA1000	**BA200**	1.37	1.31	6.18	5.83	1.66	1.83
	BA250	1.38	1.39	6.31	5.90	2.00	2.33
	BA300	1.44	1.40	6.75	6.28	2.50	2.66
GA1500	**BA200**	1.33	1.29	5.63	5.44	1.33	1.50
	BA250	1.34	1.30	5.66	5.59	1.50	1.66
	BA300	1.36	1.31	6.00	5.66	1.83	2.00
L.S.D. at 0.05		**0.14**	**0.16**	**1.97**	**1.75**	**0.51**	**0.54**

gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together supports the results reported by Shedeed *et al.* (1991) on croton plants, Ibrahim (2005) on Jojoba plants, Eid and Abou-Leila (2006) and Ibrahim *et al.* (2010)

3.1.9. Dry weight of roots (g)

The data recorded in Table (4) showed that spraying *Dracaena marginata* plants with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together gave the heaviest root dry weights; 4.29 and 4.16 g in the first and second seasons, respectively. Whereas, it was found that spraying with tap water (control) decreased root dry weight to 3.07 and 3.21 g as compared with the other treatments in the first and second seasons, respectively. The increase in the root dry weight due to spraying with gibberellic acid at 1000 ppm and benzyladenine at 300 ppm together supports the results reported by Shedeed *et al.* (1991) on croton plants, Ibrahim (2005) on Jojoba plants, Eid and Abou-Leila (2006) and Ibrahim *et al.* (2010) on croton plants. The effect of gibberellic acid on increasing the rate of dry material of plants can be attributed to its effect on increasing photosynthesis rate through increasing leaf surface (Lester *et al.*, 2002).

3.2. Chemical constituents

3.2.1. Total chlorophyll contents (mg/g F.W)

The results of leaf chemical analysis in Table (5) show that gibberellic acid and benzyladenine treatments had clear effect on the total chlorophyll contents. The highest mean values were 2.74 and 3.11 mg/g in the first and second seasons, respectively. The values were noticed at the treatment of 1000 ppm gibberellic acid and 250 ppm benzyladenine, the first and second seasons, respectively. The least mean values were 2.22 and 2.54 mg/g in the first and second seasons, respectively, in plants sprayed with tap water (control). Similar results were reported by Shedeed *et al.* (1991) on croton plants, Eid and Abou-Leila (2006) Ibrahim *et al.* (2010) on croton plants and Majidian *et al.* (2012) on *Zantedeschia aethiopica*. Our results showed the effective role of gibberellic acid and benzyladenine on preventing of chloroplast and chlorophyll degradation which result decreasing in leaf senescence and increasing in total chlorophyll content. Chlorophyll degradation in the leaves of controlled by gibberellins was reported by Van Doorn and Van Lieburg (1993). On the other hand, cytokinins prevent leaf senescence and delay proteolysis and chlorophyll degradation (Weiss (2000) and Emongor and Tshwenyane (2004)). In addition, Emongor and Tshwenyane (2004) reported that cytokinins, increase chlorophyll development. Chlorophyll has primary basic role from the view of absorption and use of light energy in

Table (4): Mean values of root length and root dry weight of *Dracaena marginata* plants as influenced by gibberellic acid (GA3) and benzyladenine (BA) in the two seasons of 2013 and 2014.

Treatments		Root length (cm)		Dry weight of root (g)	
		2013	2014	2013	2014
Control		72.66	66.00	3.07	3.21
GA500		81.16	73.33	3.64	3.73
GA1000		81.66	73.83	3.71	3.78
GA1500		83.50	75.33	3.72	3.81
BA200		74.50	67.00	3.31	3.53
BA250		73.16	70.50	3.45	3.59
BA300		73.16	69.50	3.44	3.68
GA500	**BA200**	76.66	72.50	3.49	3.71
	BA250	78.33	72.66	3.58	3.72
	BA300	78.66	72.66	3.60	3.73
GA1000	**BA200**	84.33	76.66	4.07	3.91
	BA250	86.83	79.00	4.12	4.14
	BA300	89.16	86.50	4.29	4.16
GA1500	**BA200**	79.66	75.83	3.97	3.84
	BA250	81.66	76.00	3.99	3.88
	BA300	83.50	79.00	4.02	3.90
L.S.D. at 0.05		**10.54**	**8.18**	**0.42**	**0.48**

Table (5): Means of chemical constituents of *Dracaena marginata* plants as influenced by gibberellic acid (GA3) and benzyladenine (BA) in the two seasons of 2013 and 2014.

Treatments		Chlorophyll content (mg/g F.W)		Carbohydrates Content in leaves (%) D.W		Nitrogen content (%)	
		2013	2014	2013	2014	2013	2014
Control		2.22	2.54	14.88	14.98	2.00	1.77
GA500		2.32	2.65	15.52	15.62	2.08	1.85
GA1000		2.42	2.74	16.18	16.17	2.17	1.91
GA1500		2.36	2.69	15.80	15.86	2.12	1.88
BA200		2.32	2.61	15.48	15.42	2.08	1.82
BA250		2.42	2.72	16.16	16.08	2.17	1.90
BA300		2.38	2.66	15.93	15.70	2.14	1.85
GA500	**BA200**	2.47	2.76	16.50	16.32	2.22	1.93
	BA250	2.72	3.12	18.16	18.33	2.44	2.17
	BA300	2.61	3.01	17.44	17.74	2.34	2.10
GA1000	**BA200**	2.46	2.80	16.45	16.54	2.21	1.96
	BA250	2.74	3.11	18.31	18.39	2.46	2.17
	BA300	2.51	2.91	16.82	17.17	2.26	2.03
GA1500	**BA200**	2.50	2.86	16.71	16.89	2.24	2.00
	BA250	2.65	2.96	17.69	17.45	2.38	2.07
	BA300	2.57	2.92	17.15	17.23	2.31	2.04
L.S.D. at 0.05		**0.07**	**0.09**	**0.45**	**0.52**	**0.06**	**0.06**

photosynthesis. Effect of growth regulators of plant growth are effective on biosynthesis and decomposition of chlorophyll on photosynthesis, directly (Arteca., 1996). Gibberellic acid has structural role in the membrane of chloroplasts and causes to stimulate photosynthesis (Janowsk and Jerzy., 2003).

3.2.2. Total carbohydrates content (%)

The results in Table (5) also show that most of the tested gibberellic acid and benzyladenine concentrations increased the mean total carbohydrates in the leaves of *Dracaena marginata* plants, compared to the control. Among the plants receiving the different treatments, plants sprayed with gibberellic acid at 1000 ppm and benzyladenine at 250 ppm together had the highest total carbohydrates in the leaves: 18.31 and 18.39 % in the first and second seasons, respectively. Similar results were reported by Eid and Abou-Leila (2006) Abd El-Aziz (2007) and Ibrahim *et al.* (2010) on croton plants. Gibberellic acid causes to increase plasticity of cellular wall, too. This problem can be due to acidification of cellular wall or as a result of absorption of calcium ion inside cytoplasm (Baninasab and Rahemi., 1994). It has been proved that gibberellic acid increases the activity of oxigenase carboxilase non phosphate ribolose (Rabisco) enzyme which is a main photosynthesis enzyme in plants.

3.2.3. Nitrogen percentage in the leaves (%)

The results in Table (5) also show that the mean nitrogen content of the leaves was slightly induced by spraying the plants with gibberellic acid at 1000 ppm and benzyladenine at 250 ppm together which gave nitrogen contents of 2.46 and 2.17 % in the first and second seasons, respectively, compared to the control. The least values (2.00 and 1.77 % in the first and second seasons, respectively) were recorded in the plants sprayed with tap water (control). Similar results were reported by Sayed (2001) on *Khaya senegalensis*, Mohammed (2003) on *Acacia saligna*, Ibrahim (2005) on Jojoba plants, Eid and Abou-Leila (2006) Abd El-Aziz (2007) and Ibrahim *et al.* (2010) on croton plants.

Conclusions

Plant growth regulators (growth promoter and growth retardants) are known to regulate the metabolism in the plant by increasing the duration of the source there by maintaining the proper balance of source and sink. The degree of perfect physiological relations indirectly affects without causing malformation in the plants. In this connection, application of growth regulators to optimize plant production by modifying growth, development and the quantitative and qualitative yield of plants.

According to these points, necessity of using growth regulator to improve quality, marketing is a complete justification. Among treatments, gibberellic acid 1000 ppm with benzyladenine 300 ppm showed good results and their means did not have significant difference with each other, but they showed significant difference with other treatments. Gibberellic acid 1000 ppm with benzyladenine 300 ppm had the most plant height, leaf number per plant, dry weight of leaves, leaf area, stem diameter, dry weight of stem, branche number per plant, root length and dry weight of root that were showed significant difference with other treatments. Gibbberellic acid 1000 ppm with benziladenine 250 ppm was the most effective treatment on total chlorophylls, carbohydrates and nitrogen contents. This treatment was significantly different with the control respecting to total chlorophylls .

Generally, the obtained results showed that spraying *Dracaena marginata* plants with gibberellic acid and benzyladenine together was better than spraying dracaena plants with benzyladenine or gibberellic acid alone. The two growth regulators together improved vegetative growth and some chemical components of *Dracaena marginata* plants.

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تأثير رش البنزيل أدنين وحمض الجبريليك على النمو الخضرى والتحليل الكيماوى فى الدراسينا مارجيناتا(*Dracaena marginata*)
1- النباتات غير المطوشة

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فرع بحوث الحدائق النباتية بأنطونيادس - *فرع بحوث نباتات الزينة بأنطونيادس - معهد بحوث البساتين - مركز البحوث الزراعية- الإسكندرية - مصر

ملخص

كان الهدف من هذه الدراسة معرفة تأثير الرش بحمض الجبرللين والبنزيل أدنين على تحسين جودة نباتات الدراسينا مارجيناتا. تمت هذه الدراسة خلال موسمى 2013 و 2014 فى مشتل الأفرع البحثية بأنطونيادس – معهد بحوث البساتين – مركز البحوث الزراعية بالإسكندرية. تم زراعة شتلات الدراسينا فى أوانى بلاستيكية ذات قطر 30 سم. رشت النباتات بحمض الجبرللين بتركيزات (500,1000,1500 جزء فى المليون) كذلك بالبنزيل أدنين بتركيزات (200,250,300 جزء فى المليون).

أظهرت النتائج أن رش نباتات الدراسينا بحمض الجبرللين 1000 جزء فى المليون بالإضافة إلى البنزيل أدنين 300 جزء فى المليون أعطى نتائج معنوية فى كل من أرتفاع النبات , عدد الأوراق , الوزن الجاف للأوراق, المساحة الورقية , قطر الساق , الوزن الجاف للساق ,عدد الأفرع على النبات , طول الجذور , الوزن الجاف للجذور. بينما أظهرت نتائج رش النباتات بحمض الجبرلين 1000 جزء فى المليون بالإضافة إلى البنزيل ادنين 250 جزء فى المليون أعطى نتائج معنوية فى كل من محتوى الكلوروفيل الكلى ومحتوى الكربوهيدرات الكلية , نسبة النيتروجين فى الأوراق.