Effect of Foliar Applied Benzyladenine and Gibberellic Acid on Vegetative Growth and Chemical ConsTituents of *Dracaena marginata*. (B) Pinched Plants.

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ABSTRACT: 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. In this study, we aimed to test the effect of applying foliar sprays of gibberellic acid and benzyladenine in increasing the marketing quality of *Dracaena marginata* plants. Dracaena small plants were planted individually in 30 cm diameter plastic pots. The small plants were pinched to length to 30 cm from soil surface. The plants were sprayed with gibberellic acid at the concentrations of 500, 1000 and 1500 mg/L and benzyladenine at the concentrations of 200, 250 and 300 mg/L. The obtained results showed that spraying with gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together increased significantly plant height, leaves number per plant, leaves dry weight, leaves area, stem diameter, stem dry weight, branches number per plant, root length and root dry weight. The obtained results showed that spraying with gibberellic acid at 1000 mg/L and benzyladenine at 250 mg/L together resulted in the highest chlorophyll content, carbohydrates content and nitrogen percentage in the leaves.
Key words: *Dracaena marginata* **-** gibberellic acid **–** benzyladenine.

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*a, *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**).

Plant growth regulators (cytokinins and gibberellins) are used in agricultural industry for stimulation and synchronization of flowering and fruit setting, promotion of rooting, reduction of vegetative growth, reduction of lodging of agronomic crops, or defoliation **(Briant, 1974)**. Cytokinins are plant hormones that plants produce naturally and regulate plant growth, including cell division and leaf senescence. There are several commercial plant growth regulators (PGRs) that contain benzyladenine, a synthetic cytokinin **(Padhye *et al.*, 2008)**. It can be applied as a foliar spray or a substrate drench at different concentrations. The useful application concentration differs greatly between ornamental plants and is generally unknown **(Werbrouk *et al.*, 1996)**. The results Obtained with exogenous cytokinins, however, vary depending on the type and concentration of the cytokinins used (**Bosse and Staden, 1989).**

Cytokinines appeared 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** and **Hall, 1973)**. Gibberellins are commonly used as growth enhancers because they cause cell elongation in the plant. They can be used to partially overcome dormancy, increase flower size, flower number, flower uniformity, and to create standards. A gibberellin overdose will result in a spindly unmarketable plant **(Runkle, 2006** and **Leopold and Kriedmann, 1975)**.

Gibberellins are synthesized from mevalonic acid in young tissues of shoots and developing seeds **(Davies, 1995)**. Transport is via both the xylem and the phloem. The effects of gibberellins vary by plant species. Some plant species respond with an increase in height due to an increase in cell length. Other plant species respond to gibberellins by increasing cell number as well as an increase in size, most likely cell length. Gibberellins prevent the development of lateral buds when applied to decapitated shoots of several species **(Salisbury and Ross, 1969)**.The aim of this research is to study some important traits of Dracaena plants treated with gibberellic acid and benzyladenine on the marketing qualities.

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. On 10th of March, 2013 and 2014 (in the first and second seasons, respectively) homogenous small plants 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 8 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 illustrated in Table (1). On the 10th of March in both seasons, the small plants were pinched to a length of 30 cm of the soil surface. Plants were sprayed with gibberellic acid at concentrations of 500, 1000 and 1500 mg/L and benzyladenine at concentrations of 200, 250 and 300 mg/L, every 30 days starting from on 10th of April till 10th of July in both seasons. The control plants were sprayed with tap water. On 10th of August in both seasons the plants were harvested.

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

In both seasons, all plants received NPK chemical fertilization using fertilizer (Milagro Aminoleaf 20-20-20) at the rate of 2.0 g per pot each time. Fertilization was repeated every 30 days throughout the growing season (from

the 20th of March till the 20th of July). In addition, weeds were removed manually upon emergence.

Data were recorded as follows:

1.Vegetative growth parameters:

Plant height (cm), leaves number per plant, dry weight of leaves (g), leaves area (cm^2), stem diameter (cm), dry weight of stem (g), branches number per plant, root length (cm) and dry weight of root (g).

2.Chemical analysis determination:

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

The experimental design was a complete randomized block design (RCBD) contained 16 treatments with three replicates; each treatment 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).**

RESULTS

1. Vegetative growth

1.1. Plant height (cm)

Data in Table (2) indicated that gibberellic acid and benzyladenine treatments had a significant effect on the plant height. In both seasons, plants sprayed with gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together gave the tallest plant height compared to the control plants. As with other vegetative growth parameters, spraying the plants with gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together gave the tallest plants 44.75 and 46.08 cm (in the first and second season, respectively).

1.2. Number of leaves per plant

Data presented in Table (2) showed that, the different gibberellic acid and benzyladenine treatments had a significant effect on the number of leaves per plant of *Dracaena marginata* plants. Plants sprayed using gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together forming significantly larger leaves with a mean leaves number of 79.16 and 78.50 (in the first and second seasons, respectively). On the other hand, compared to that of control plants, the lowest number of leaves per plant was found to be 57.00 and 48.16 (in the first and second seasons, respectively).

1.3. Leaves dry weight (g) per plant

Data presented in Table (2) also showed that spraying *Dracaena marginata* plants with gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together significantly increased the dry weight of leaves giving values of

22.62 and 25.00 g per plant (in the first and second seasons, respectively), compared to the control 12.23 and 12.26 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 mg/L and benzyladenine at 300 mg/L together increased significantly leaves dry weight compared to other treatments.

1.4. Leaves area (cm^2)

Data presented in Table (2) showed that the different gibberellic acid and benzyladenine treatments had a significant effect on leaves area of *Dracaena marginata* plants. Plants sprayed using gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together formed significantly larger leaves (with a mean area of 3084.72 and 3064.38 cm^2 (in the first and second seasons, respectively), than those formed by control plants 1356.72 and 1355.64 cm^2 (in the first and second seasons, respectively).

Table (2). Average values of plant height and number, dry weight and area of leaves *Dracaena marginata* plants as influenced by benzyladenine (BA) and gibberellic acid (GA3) in the two seasons of 2013 and 2014.

Treatments (mg/L)	Plant height (cm)		Number Leaves per plant		Dry weight of leaves (g)		Leaves area (cm^2)	
	2013	2014	2013	2014	2013	2014	2013	2014
Control	36.41	35.75	57.00	48.16	12.23	12.26	1356.72	1355.64
GA500	40.66	39.25	69.33	69.33	16.26	17.79	2623.54	2479.95
GA1000	41.00	39.58	70.16	70.33	18.19	18.85	2627.86	2561.79
GA1500	41.91	40.25	70.66	71.16	18.72	19.04	2717.59	2711.61
BA200	37.33	35.83	58.66	57.00	12.82	15.00	1766.58	1692.35
BA250	36.58	37.75	64.66	61.33	13.25	15.44	1809.16	1728.10
BA300	36.91	37.16	66.16	62.83	13.86	16.12	2008.39	1965.70
GA500 + BA200	38.41	38.58	66.50	63.16	14.75	16.29	2171.86	2080.64
GA500 + BA250	39.25	38.83	66.83	65.66	15.06	16.44	2273.99	2088.07
GA500 + BA300	39.33	38.83	68.66	66.33	15.66	16.50	2309.69	2259.95
GA1000 + BA200	42.25	40.83	77.50	74.83	21.66	20.24	3025.77	3019.17
GA1000 + BA250	43.41	42.25	78.66	75.33	22.10	21.18	3030.35	3049.20
GA1000 + BA300	44.75	46.08	79.16	78.50	22.62	25.00	3084.72	3064.38
GA1500 + BA200	40.00	40.58	72.50	72.50	18.82	19.05	2802.09	2738.34
GA1500 + BA250	41.00	40.58	75.66	73.33	19.61	19.34	2861.03	2882.88
GA1500 + BA300	41.91	42.16	76.16	74.00	20.18	19.58	2996.29	2937.00
L.S.D. at 0.05	**5.19**	**4.36**	**11.78**	**14.08**	**6.99**	**6.19**	**477.94**	**495.43**

1.5. Stem diameter (cm)

Data recorded in Table (3) showed that spraying *Dracaena marginata* plants with gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together gave the largest stem diameter1.59 and 1.53 cm as compared with control treatment which gave 1.19 and 1.22 cm (in the first and second season, respectively).

1.6. Dry weight of stem (g)

Data recorded in Table (3) showed that spraying *Dracaena marginata* plants with gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together gave the heaviest values of stem dry weight 7.02 and 6.85g (in the first and second seasons, respectively). Whereas, it was found that spraying with tap water (control) decreased the stem dry weight to 5.01 and 5.29g as compared with other treatments.

1.7. Number of branches per plant

Data in Table (3) showed that plants sprayed with gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together formed the highest number of branches per plant which gave3.16 and 3.33 in the first and second seasons, respectively. Whereas, control plants gave the lowest number of branches per plant 1.00 and 1.00 (in the first and second season, respectively).

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

Treatments (mg/L)	Stem diameter (cm)		Dry weight of stem (g)		Number branches per plant	
	2013	2014	2013	2014	2013	2014
Control	1.19	1.22	5.01	5.29	1.00	1.00
GA500	1.34	1.38	5.95	6.16	1.00	1.50
GA1000	1.36	1.39	6.06	6.23	1.50	1.83
GA1500	1.37	1.40	6.08	6.27	1.16	1.66
BA200	1.22	1.30	5.41	5.81	1.66	1.66
BA250	1.27	1.32	5.64	5.92	2.16	2.33
BA300	1.27	1.35	5.63	6.07	2.33	2.16
GA500 + BA200	1.28	1.36	5.70	6.11	1.33	1.66
GA500 + BA250	1.32	1.37	5.86	6.13	1.50	2.00
GA500 + BA300	1.32	1.37	5.88	6.14	1.66	1.83
GA1000 + BA200	1.50	1.44	6.65	6.45	2.00	2.00
GA1000 + BA250	1.52	1.52	6.74	6.83	3.00	3.16
GA1000 + BA300	1.59	1.53	7.02	6.85	3.16	3.33
GA1500 + BA200	1.47	1.42	6.50	6.32	1.66	1.66
GA1500 + BA250	1.46	1.43	6.52	6.39	2.33	3.00
GA1500 + BA300	1.49	1.43	6.58	6.43	2.50	3.16
L.S.D. at 0.05	**0.15**	**0.18**	**0.69**	**0.80**	**0.50**	**0.57**

1.8. Root length (cm)

Data recorded in Table (4) showed that spraying *Dracaena marginata* plants with gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together gave the highest values of root length116.80 and 114.18 cm as compared with control treatment which gave 95.19 and 87.12 cm (in the first and second season, respectively).

1.9. Dry weight of root (g)

Data recorded in Table (4) showed that spraying *Dracaena marginata* plants with gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together gave the largest root dry weight 6.31 and 5.91g (in the first and second seasons, respectively). Whereas, it was found that spraying with tap water (control) decreased the root dry weight to 3.78 and 3.93g (in the first and second seasons, respectively).

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

Treatments (mg/L)	Root length (cm)		Dry weight of root (g)	
	2013	2014	2013	2014
Control	95.19	87.12	3.78	3.93
GA500	106.32	96.80	4.79	4.70
GA1000	106.98	97.46	5.09	4.85
GA1500	109.38	99.44	5.13	5.00
BA200	97.59	88.44	4.09	4.35
BA250	95.84	93.06	4.33	4.38
BA300	95.84	91.74	4.34	4.45
GA500 + BA200	100.43	95.70	4.43	4.54
GA500 + BA250	102.61	95.92	4.49	4.65
GA500 + BA300	103.05	95.92	4.55	4.67
GA1000 + BA200	110.47	101.20	5.78	5.49
GA1000 + BA250	113.75	104.28	5.90	5.55
GA1000 + BA300	116.80	114.18	6.31	5.91
GA1500 + BA200	104.36	100.10	5.26	5.13
GA1500 + BA250	106.98	100.32	5.29	5.27
GA1500 + BA300	109.38	104.28	5.61	5.33
L.S.D. at 0.05	**13.81**	**10.79**	**1.84**	**1.65**

2. Chemical constituents

2.1. Total chlorophylls content (mg/g F.W)

The results of leaf chemical analysis in Table (5) also showed that the gibberellic acid and benzyladenine treatments had clear effect on the total chlorophylls content. The recorded mean values ranged from 2.39 and 2.40 mg/g in the first and second seasons, respectively, in plants sprayed with gibberellic acid at 1000 mg/L and benzyladenine at 250 mg/L together to 1.95 and 1.99mg/g in the first and second seasons, respectively, in plants sprayed with tap water (control).

2.2. Total carbohydrates content (%)

The results in Table (5) also showed 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 mg/L and benzyladenine at 250 mg/L together had the highest

carbohydrates in leaves of 19.36 and 19.50 % (in the first and second seasons, respectively).

2.3. Nitrogen percentage in leaves (%)

The results in Table (5) also show that the mean nitrogen content of the leaves was slightly increased by spraying the plants with gibberellic acid at 1000 mg/L and benzyladenine at 250 mg/L together which gave nitrogen contents of 2.29 and 2.34 % (in the first and second seasons, respectively), compared to the control. The lowest values 1.88 and 1.94 % (in the first and second seasons, respectively), were recorded in plants sprayed with tap water (control).

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

Treatments (mg/L)	Chlorophyll content (mg/g F.W)		Carbohydrates Content in leaves (%) D.W		Nitrogen content (%)	
	2013	2014	2013	2014	2013	2014
Control	1.95	1.99	15.86	16.17	1.88	1.94
GA500	2.05	2.05	16.64	16.66	1.97	2.00
GA1000	2.10	2.15	17.05	17.46	2.02	2.10
GA1500	2.08	2.09	16.85	16.97	2.00	2.04
BA200	2.03	2.04	16.50	16.57	1.96	1.99
BA250	2.12	2.12	17.21	17.20	2.04	2.07
BA300	2.09	2.07	16.98	16.82	2.01	2.02
GA500 + BA200	2.14	2.16	17.39	17.60	2.06	2.11
GA500 + BA250	2.38	2.38	19.31	19.36	2.30	2.32
GA500 + BA300	2.28	2.29	18.47	18.59	2.19	2.23
GA1000 + BA200	2.16	2.17	17.51	17.64	2.08	2.12
GA1000 + BA250	2.39	2.40	19.36	19.50	2.29	2.34
GA1000 + BA300	2.18	2.27	17.72	18.44	2.10	2.21
GA1500 + BA200	2.20	2.21	17.84	17.93	2.12	2.15
GA1500 + BA250	2.30	2.33	18.67	18.93	2.21	2.27
GA1500 + BA300	2.22	2.28	18.00	18.55	2.14	2.22
L.S.D. at 0.05	**0.06**	**0.05**	**0.47**	**0.44**	**0.06**	**0.05**

DISCUSSION

Results of this study and other studies confirm that gibberellic acid and benzyladenine increase some process such as cell wall tension and thus cell water potential decline **(Fathi and Esmaeelpoor, 1999)** and more water absorption to cell and at last increase fresh weight succulence (**Mutui *et al.,* 2001** and **Emongor and Tshwenyane, 2004)**. On the other hand effect of gibberellic acid and benzyladenine on increasing of carbohydrate hydrolysis induction cause to stability of respiration **(De-Hortogh, 1996)**. Effect of gibberellic acid and benzyladenine on preventing of senescence (**Pun *et al.*, 1999**, **Ranwala and Miller, 2000** and **Emongor and Tshwenyane, 2004)** and its effect on chlorophyll synthesis and chloroplast development increasing

prevent from leaves yellowing **(Guo *et al.*, 2003** and **Emongor and Tshwenyane, 2004)**. Thus, gibberellic acid interferes in retard chlorophyll destroy. Therefore, a section of this effect is caused to chlorophyll preservation that is attendant with leaf nitrogen level preservation.

It has been known that the use of growth regulators in agriculture practices is most favourable for promoting and improving plant-growth of different plants. The beneficial effect of gibberellic acid on different plants were recorded by **(Shedeed *et al.,* 1991)** on croton plant, **(Eraki, 1994a)** on Queen Elizabeth rose plants, **(Bedour *et al.,* 1994)** on *Ocimum basillicum.* They concluded that gibberellic acid is used for regulating plant growth through increasing cell division and cell elongation. The effect of cytokinins, especially benzyl adenine, on the plant growth and chemical constituents of different plants have mentioned by **(Eraki *et al.,* 1993)** on salvia plants, **(Mazrou, 1992)** on Datura, **(Mazrou *et al.,* 1994)** on sweet basil, **(Mansoure *et al.,* 1994)** on soybean plants and **(Vijayakumari, 2003)** on *Andrographis panculata.* Cytokinins are important plant hormones that regulate various processes of plant growth and development including cell division and differentiation, enhancement of leaf expansion and nutrient mobilization **(Hassan and El-Quesni, 1989** and **Shudok, 1994)**. The response of plants to cytokinins have been also discussed in more papers such as **(Eraki , 1994b)** on *Hibiscus sabdarijfa* L. plants who mentioned that application of BA significantly increased plant height, number of branches as well as fresh and dry weights of leaves than the control. **Hassanein (1985)** on *Pelargonium graveolens,* **(El-Sayed *et al.*, 1989)** on *Polianthus tuberosa,* **(Menesi *et al.,* 1991)** on *Calendula officinalis* and **(Mazrou *et al.*, 1994)** on sweet basil, found that foliar application of BA increased growth of different organs, active constituents production of these plants and increased total carbohydrates content on comparison to the untreated plants.

According to these points, necessity of using growth regulator to improve marketing quality is completely justified. Among treatments that we used in this study, gibberellic acid 1000 mg/L with benzyladenine 300 mg/L 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 mg/L with benzyladenine 300 mg/L gave the best plant height, number of leaves per plant, dry weight of leaves, leaves area, stem diameter, dry weight of stem, number of branches per plant, root length and dry weight of root which significant differences with other treatments. Similar increase in the vegetative growth was recorded by **(Shedeed *et al.*, 1991)** on croton plants, **(Rahman *et al.*, 2004)** on soybean, **(Soad, 2005)** on Jajoba plants, **(Rawia and Bedour, 2006)** on croton plants and **(Soad *et al.*, 2010)** on croton plants.

Gibbberellic acid at 1000 mg/L with benziladenine at 250 mg/L together were the most effective treatment on total chlorophyll, carbohydrates and nitrogen content. This treatment was significantly different with control respecting to total chlorophyll and was significantly different with control. Similar results in the chlorophylls content reported by **(Shedeed *et al.*, 1991)** on croton plants, **(Mousa *et al.*, 2001)** on *Nigella sativa*, **(Rawia and Bedour, 2006)** on

croton plants, **(Soad *et al.*, 2010)** on croton plants and **(Majidian *et al.,* 2012)** on *Zantedesehia aethiopied*. Similar results in the carbohydrates content reported by **(Sheren, 2005)** on flax plants, **(Rawia and Bedour, 2006)** on croton plants, **(Nahed, 2007)** on croton plants and **(Soad *et al.*, 2010)** on croton plants. Similar results in the nitrogen content reported by **(Sayed, 2001)** on *Khaya senegalensis*, **(Mohammed, 2003)** on *Acacia saligna*, **(Soad, 2005)** on Jajoba plants, **(Rawia and Bedour, 2006)** on croton plants, **(Nahed, 2007)** on croton plants and **(Soad *et al.*, 2010)** on croton plants.

CONCLUSIONS

The present results reported about the vegetative growth parameters and chemical compositions of *Dracaena marginata* showed that the best spraying treatments of gibberellic acid at 1000 mg/L and benzyladenine at 300 mg/L together gave the best quality results for plant height, number of leaves, leaves area, stem diameter, branches number and root length of *Dracaena marginata* pinched plants.Generally, the results obtained to sprayed *Dracaena marginata* plants with gibberellic acid and benzyladenine together better than spraying dracaena plants with gibberellic acid or benzyl adenine alone enhanced good vegetative growth and some chemical components of plants *Dracaena marginata* plants.

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الملخص العربى

تأثير رش البنزيل أدنين وحمض الجبريليك على النمو الخضرى والتحليل الكيماوى فى الدراسينا مارجيناتا. (ب) النباتات المطوشة

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تمت هذه الدراسة خلال موسمى ٢٠١٣ و ٢٠١٤ فى مشتل الأفرع البحثية بأنطونيادس – معهد بحوث البساتين – مركز البحوث الزراعية بالإسكندرية. كان الهدف من هذه الدراسة هو معرفة تأثير الرش بحمض الجبرللين والبنزيل أدنين على تحسين جودة نباتات الدراسينا مارجيناتا ورفع قيمتها التسويقية. تم زراعة نباتات الدراسينا الصغيرة فى أوانى بلاستيكية ذات قطر ٣٠ سم. تم تطويش النباتات على أرتفاع ٣٠ سم من سطح التربة. رشت النباتات بحمض الجبرللين بتركيزات (٥٠٠، ١٠٠٠،١٥٠٠ مجم/لتر) كذلك بالبنزيل أدنين بتركيزات (٢٠٠،٢٥٠،٣٠٠ مجم/لتر).

وكانت النتائج المتحصل عليها أظهرت أن رش نباتات الدراسينا بحمض الجبرللين ١٠٠٠ مجم/لتر بالإضافة إلى البنزيل أدنين ٣٠٠ مجم/لتر 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 ١٠٠٠ مجم/لتر بالإضافة إلى البنزيل ادنين ٢٥٠ مجم/لتر أعطى نتائج معنوية فى كل من محتوى الكلوروفيل الكلى ونسبة الكربوهيدرات الكلية ، نسبة النيتروجين فى الأوراق.