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EFFECT OF GROWING MEDIA AND CHEMICAL FERTILIZATION ON GROWTH AND CHEMICAL COMPOSITION OF *Dracaena marginata* "BICOLOR"

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ABSTRACT

This study was carried out at Ornamental Horticulture Department,Faculty of Agriculture, Cairo University during two seasons; 2007 and 2008 aiming to study the effect of different soil media (peatmoss or peatmoss + sand (1:1 by volume), NPK (19:19:19) fertilization at 0, 1, 2, 3 and 4 g/ plant and spraying with trace elements (Fe, Mn and Zn) at 50 and 100 ppm on growth and chemical composition of Dracaena marginata 'Bicolor'. The results showed that growing plants in peatmoss medium gave the highest values of plant height, number of leaves/ plant, fresh and dry weights of leaves/ plant, total carbohydrates, N, K, Fe, Mn and Zn percent in leaves. Whereas peat + sand medium gave the highest values of stem diameter, leaf area and P contents in leaves in both two seasons.

NPK at 1 and 2 g and NPK fertilizers plus trace elements increased plant height, stem diameter, number of leaves/plant, leaf area, fresh and dry weights of leaves/ plant compared with control in the first and second seasons. Also, all chemical fertilization treatments increased total carbohydrates, N, P, K, Fe, Mn and Zn percent in leaves as compared with control plants in the first and second seasons.

Using peatmoss or peatmoss + sand medium combined with NPK at 1 g/ plant alone or NPK at 1 g plus trace elements gave the highest values of most characters.

Key words: *Dracaena marginata***,** soil media, NPK fertilization and trace elements**.**

INTRODUCTION

Dracaena is a genus of about 40 species of trees and succulent shrubs classified in the family *Ruscaceae* in the APG II system, or, according to some treatments, separated (sometimes with *Cordyline*) into a family of their own,

Dracaenaceae or in the *Agavaceae*. The majority of the species are native in Africa, with a few in southern Asia and one in tropical Central America.

Dracaenas are propagated commercially by vegetative methods. *Dracaena marginata* and its cultivars are propagated from cuttings or, in a few instances, air layers are used on relatively large stems. Most small dracaenas are started from terminal cuttings with foliage to the base. Very large cuttings and layers generally have exposed stems at the base. Plants can be propagated from cane sections, but are rarely done so because of the undesirable branching angle of shoots from the upper portion of cane. Most propagation material used by Florida growers comes from the Caribbean Basin and Central America, although a few nurseries in south Florida maintain stock plants of *D. marginata* in full sun. Cuttings placed in small pots are usually plunged to the bottom to insure support. Cuttings and layers used in larger containers are set slightly above the base to provide a better environment for root development.

It is a popular houseplant that needs little attention, with several cultivars available with the leaves variegated with red or pale yellow. It requires a minimum temperature of 15° C (59° F), and is more tolerant than most plants of dry soil and irregular watering, though liable to root decay in permanently wet soil. Because it requires minimal care it is very popular in offices where the constant heat and light suits their growing requirements.

It has been widely confused with other species of *Dracaena*, and many or most of the plants in cultivation under this name may actually be *D. cincta* or *D. concinna* (Huxley, 1992).

Many factors affecting growth of many foliage plants, such as growing media; Wazir *et al.* (2003) on *Dracaena deremensis*; Wazir *et al.* (2004) on *Schefflera actinophylla;* El-Khateeb *et al.* (2006) on *Ficus alii*; Papafotiou *et al.*(2008) on *Codiaeum variegatum* and Salvador (2008) on *Polypodium aureum.*

Also, NPK fertilization affecting growth of many foliage plants; Poole and Li and Zhang (2002) on *Anthurium andraeanum*; Wazir *et al.*, (2004)on *Schefflera actinophylla*; Dorgham (2005) on *Dieffenbachia* and *Philodendron erubescens*; Jimenez and Lao (2005) on *Dieffenbachia amoena*; Segura *et al.* (2005) on *Dieffenbachia maculata* and Srinivasa (2006) on *Anthurium andraeanum.*

The effect of trace elements were studied by many authors; Said (1997) on croton plant and Dorgham (2005) on *Dieffenbachia* and *Syngonium podophylum* plants.

MATERIALS AND METHODS

This study was carried out at Ornamental Horticulture Department, Faculty of Agriculture, Cairo University during two seasons 2007 and 2008 aiming to study the effect of NPK (19:19:19) fertilization, trace elements (Fe, Mn and Zn) and growing media on growth and chemical composition of *Dracaena marginata* 'Bicolor'.

Dracaena marginata 'Bicolor' terminal rooted cuttings with 10-15 cm length were transplanted on January 25th 2007 and 2008 in 20 cm pots (one plant/ pot) filled with different soil media (peatmoss or peatmoss + sand (1:1 by volume) and after one month of transplanting the plants received the first application of fertilizers (NPK at 1, 2, 3and 4 g/ plant and NPK at 1 g + spraying trace elements (Fe + Mn + Zn) at 50 and 100 ppm . The plants were located under the greenhouse condition and irrigation was done as the plants needed.

The plants fertilized monthly with NPK at the mentioned doses. Trace elements (Fe 6% - Zn 12% - Mn 10%) were mixed and dissolved in a tap water at 50 and 100 ppm and added as spraying monthly on the plant leaves.

The layout of the experiment was split plot design, which soil media represented as main plots, while chemical fertilization treatments represented as sub plots in three replicates, each replicate consisted of 4 plants.

The following data were recorded during the growth period for nine months. In the end of the experiment plant height (cm), stem diameter (cm), leaves number, leaf area (cm^2), fresh and dry weights of leaves , total carbohydrates, N, P, K, Fe, Mn and Zn percent in leaves were determined.

Total carbohydrates in dried leaves was determined according to Herbert *et al*. (1971) Nitrogen content was determined by the modified micro kieldahl method as described by Pregl (1945).

Phosphorus content was estimated as recommended by Troug and Meyer (1939).Potassium content was determined according to Piper (1950). Iron, manganese and zinc were determined by using flame emission spectrophotometer with a boiling air-acetylene burner (Isaac and Kerber, 1971).

Data recorded on vegetative growth, were statistically analyzed, and separation of means was performed using the Least Significant Difference (L.S.D.) test at the 5% level, as described by (Snedecor and Cochran, 1980).

RESULTS AND DISCUSSION

1 – Plant height:

As shown in Table (1) plants grown in peatmoss only gave 47.26 cm and 57.24 cm as best results as compared with peat: sand medium in first and second seasons, respectively. This increase was significantly in the second season. Similar results were obtained by Wazir *et al.* (2003) on *Dracaena deremensis*; El-Khateeb *et al.* (2006) on *Ficus alii*, Papafotiou *et al.* (2008) on *Codiaeum variegatum* and Salvador (2008) on *Polypodium aureum*,

NPK fertilizers and NPK fertilizers plus trace elements increased plant height compared with control in the first season, while in the second season; all treatments increased it compared to control, except NPK at 3 and 4 g/ pot treatments which decreased it. The best results were NPK at 1 g/ plant and NPK+50 ppm trace elements in the first and second seasons, respectively.

Interaction between soil media and chemical fertilizers had a significant effect on the plant height. NPK at 1 g/ plant and peatmoss treatment gave the maximum increase in first and second seasons. Whereas the shortest plants were obtained from control and peat: sand treatment in the first season and from NPK at 4 g/ plant combined with peat: sand in the second season.

2 – Stem diameter:

The results in Table (1) showed that peat: sand growing media gave the best results compared to peatmoss medium in first and second seasons. These results are in agreement with those obtained by Stamps and Evans (1999) on *Dracaena marginata*; Wazir *et al.*(2004) on *Schefflera actinophylla* and El-Khateeb *et al.* (2006) on *Ficus alii*, they showed that using peatmoss in growing media increased stem diameter.

All fertilization treatments had no significant effect on stem diameter compared to control in the first season, except NPK at 1 g +50ppm trace elements which significantly increased it. This trend was different in the second season. NPK at 1 and 2 g/ plant significantly increased stem diameter compared with control. While increasing NPK fertilization to 3 and 4 g/ plant significantly decreased stem diameter compared with control. NPK at 1 g combined with trace elements at 50 or 100 ppm significantly increased stem diameter compared with control treatment. The highest value was obtained due to NPK at 1 g +100 ppm trace elements.

Interaction between growing media and chemical fertilization had a significant effect on stem diameter in both seasons. The highest value was obtained from the plants growing in peat: sand and treated with 1 g NPK+ 50 ppm trace elements in the first season and from plant fertilized by 1 g NPK+100

Table 1. Effect of soil media, NPK fertilizers and trace elements on plant height (cm) and stem diameter (cm) of *Dracaena marginata* "Bicolor" at 2006/2007 and 2007/2008 seasons.

Fertilization Treatments (B)		Soil media (A)					
		M 1	M2	Mean	M1	M2	Mean
		2006/2007			2007/2008		
		Plant height (cm)					
Control		45.67	38.50	**42.08**	54.17	57.33	**55.75**
NPK at g/ pot	**1**	54.00	48.33	**49.67**	63.33	60.00	**61.67**
	2	47.67	43.83	**45.75**	59.67	57.67	**58.67**
	3	45.50	48.67	**47.08**	52.67	51.67	**52.17**
	4	44.42	41.25	**42.83**	46.83	45.67	**46.25**
NPK1g + trace elements (ppm)	**50**	49.17	48.67	**48.92**	61.67	62.17	**61.92**
	100	47.42	45.67	**46.54**	62.33	57.33	**59.83**
Mean		**47.26**	**46.01**	------	**57.24**	**55.98**	------
LSD at 0.05 for:	**(A)**			**N.S.**			**1.04**
	(B)			**1.40**			**1.95**
	(AB)			**1.908**			**2.75**
		Stem diameter (cm)					
Control		1.21	1.32	**1.26**	1.26	1.42	**1.34**
NPK at 1g/ pot	**1**	1.21	1.28	**1.25**	1.42	1.39	**1.40**
	2	1.17	1.22	**1.20**	1.42	1.42	**1.42**
	3	1.14	1.33	**1.24**	1.30	1.26	**1.28**
	4	1.22	1.25	**1.24**	1.27	1.21	**1.24**
NPK 1g+ trace elements (ppm)	**50**	1.27	1.37	**1.32**	1.35	1.46	**1.41**
	100	1.18	1.33	**1.25**	1.50	1.46	**1.48**
Mean		**1.20**	**1.30**	-----	**1.36**	**1.38**	----
LSD at 0.05 for:							
	(A)			**0.02**			**0.03**
	(B)			**0.04**			**0.05**
	(AB)			**0.05**			**0.07**

M1 = Peatmoss M2 = Peat + sand (1:1 by volume) Trace elements = Fe + Mn + Zn

ppm trace elements/ plant and growing in peatmoss medium in the second season. Whereas the least values were obtained from the plants growing in peatmoss and treated with 3 g NPK/ plant in the first season and from 4 g NPK/ plant combined with peat: sand (1:1) in the second one.

3 - Number of leaves/ plant:

Data in Table (2) showed that plants grown in peatmoss medium gave the highest number of leaves/plant compared with peat + sand medium in first and second seasons. This increase was significant in the first season. Similar results were obtained by Wazir *et al.* (2004) on *Schefflera actinophylla*; El-Khateeb *et al.* (2006) on *Ficus alii* ; Papafotiou *et al.* (2008) on *Codiaeum variegatum* and Salvador (2008) on *Polypodium aureum*.

All fertilization treatments significantly increased number of leaves/plant compared with control plants, except 4 g NPK treatment which decreased it in the first season. On the other hand, all fertilization treatments decreased number of leaves/plant compared with control in the second season. The best result was obtained from 1 g NPK+100 ppm trace elements/plant and the lowest result was obtained from 4 g NPK/ plant in the first season. In the second season best result was produced from control and the lowest result was obtained from 4 g NPK/ plant.

Interaction between soil media and chemical fertilization had a significant effect on the number of leaves/ plant. The highest value was obtained from 1 g NPK+50 ppm trace elements combined with peatmoss, while the lowest number of leaves/ plant was obtained from NPK at 4 g/ plant combined with peat + sand in the first season. Whereas in the second season, control and peat+ sand gave the best result in the second season, while the lowest value was obtained from plants fertilized by 4 g NPK/ plant combined with peat + sand medium.

4 – Leaf area:

The results presented in Table (2) showed that, peat: sand gave the highest leaf area as compared with peatmoss medium in the first season. Whereas soil media had no significant effect on leaf area in the second season. These results are in harmony with those obtained by Gad (2003) on *Ficus benjamina* , Singh and Nair (2003) stated that on some foliage plants and El-Khateeb *et al.*, (2006) on *Ficus alii*.

Chemical fertilization treatments significantly increased leaf area compared with control plants in the first season. The best result was obtained from plants fertilized with NPK at 1 g combined with 50 ppm trace elements. In the second season, NPK at 1 g/ plant alone or combined with 50 ppm trace elements significantly increased leaf area compared with control. While NPK treatments at 3 and 4 g/ plant significantly decreased leaf area as compared with control.

Interaction between growing media and chemical fertilization had a significant effect on leaf area in both seasons. Plants grown in peat + sand and fertilized with NPK at 1 g + 50 ppm trace elements gave the highest leaf area

Table 2. Effect of soil media, NPK fertilizers and trace elements on number of leaves/ plant and leaf area (cm^2) of *Dracaena marginata* "Bicolor" at 2006/2007 and 2007/2008 seasons.

Fertilization Treatments (B)		Soil media					
		M 1	M2	Mean	M1	M2	Mean
		2006/2007			2007/2008		
		Number of leaves/ plant					
Control		39.17	47.50	**43.33**	49.17	59.00	**54.08**
NPK at 1g/ pot	1	50.17	44.67	**47.42**	52.67	50.17	**51.42**
	2	49.67	43.17	**46.42**	47.67	48.00	**47.83**
	3	49.17	44.00	**46.58**	46.33	43.17	**44.75**
	4	40.67	30.50	**35.58**	44.00	35.00	**39.50**
NPK 1g+ trace elements (pm)	50	53.33	39.50	**46.42**	46.83	54.83	**50.83**
	100	44.00	51.67	**47.83**	55.33	51.33	**53.33**
Mean		**46.60**	**43.00**	-----	**48.86**	**48.79**	----
LSD at 0.05 for:	(A)			**1.20**			**N.S.**
	(B)			**2.66**			**1.94**
	(AB)			**3.76**			**2.74**
		Leaf area (cm^2)					
Control		55.65	76.13	**65.89**	103.00	89.12	**96.04**
NPK at 1g/ pot	1	79.01	84.48	**81.75**	100.70	102.00	**101.30**
	2	84.56	72.71	**78.64**	97.67	95.06	**96.37**
	3	69.28	75.14	**72.21**	85.03	89.88	**87.46**
	4	73.26	69.65	**71.45**	71.81	72.55	**72.18**
NPK 1g+ trace elements (ppm	50	87.04	91.27	**89.16**	101.80	103.80	**102.80**
	100	74.12	84.55	**79.33**	88.25	95.57	**91.91**
Mean		**74.70**	**79.13**	-----	**92.61**	**92.57**	-----
LSD at 0.05 for:	(A)			**2.00**			**N.S.**
	(B)			**3.75**			**4.13**
	(AB)			**5.30**			**5.83**

M1 = Peatmoss M2 = Peat + sand (1:1 by volume) Trace elements = Fe + Mn + Zn

in the first season. The lowest values were obtained from the plants growing in peatmoss and untreated (control) in the first season and from 4 g NPK/ plant and peatmoss medium in the second season.

5 – Fresh weight of leaves:

As shown in Table (3) plants grown in peat + sand significantly gave the heaviest fresh weight of leaves/ plant compared with plants grown in peatmoss in the first season. Whereas in the second season, growing plants in peatmoss

medium significantly produced the heaviest fresh weight of leaves/ plant compared with peat + sand medium. Similar results are obtained by ,Wazir *et al.* (2003) on *Dracaena deremensis*; El-Khateeb *et al.* (2006) on *Ficus alii*; Papafotiou *et al.* (2008) on *Codiaeum variegatum* and Salvador (2008) on *Polypodium aureum*.

All fertilization treatments significantly increased fresh weight of leaves/ plant compared with control plants, except NPK at 4 g/ plant which significantly decreased it in the first season. On the other hand, all fertilization treatments decreased fresh weight of leaves compared with control, except 1 g NPK at 1 g alone or combined with 50 ppm trace elements which gave the heaviest fresh weight of leaves/ plant in the second season.

Interaction between growing media and chemical fertilization significantly affected fresh weight of leaves/ plant. NPK at 1 g/ plant combined with peat + sand, and NPK at 1 g/ plant combined with peatmoss gave the best results in the first and second seasons, respectively. Whereas the lowest results were obtained from control and peatmoss treatment in the first season and from 4 g NPK at 4 g/ plant combined with peat+ sand in the second one.

6- Dry weight of leaves:

The data in Table (3) showed that peatmoss medium gave the best results in the first and second seasons as compared with peat + sand medium. This increase was significant in the first season. Similar results are obtained by Wazir *et al.* (2003) on *Dracaena deremensis*; El-Khateeb *et al.* (2006) on *Ficus alii*; Papafotiou *et al.* (2008) on *Codiaeum variegatum*; Salvador (2008) on *Polypodium aureum*.

All fertilization treatments significantly increased dry weight of leaves compared with control plants, except 4 g NPK treatment which significantly decreased it in the first season. On the other hand, all fertilization treatments decreased the dry weight of leaves compared with control, except 1 g NPK alone or combined with 100 ppm trace elements which significantly increased it in the second season. The best results were obtained due to NPK at 1 g/ plant in the first and second seasons. In contrast, the lowest values were obtained due to NPK at 4 g/ plant in the first and second seasons. The stimulation effects of NPK on vegetative growth of many plants were studied by many authors; similar results are obtained by Wazir *et al.* (2004) on *Schefflera actinophylla*; Dorgham (2005) on *Dieffenbachia* plants; Jimenez and Lao (2005) on *Dieffenbachia amoena* cv. Tropic Snow; Segura *et al.* (2005) on *Dieffenbachia maculata* cv. Camille.

Fertilization	**Soil media**

		M 1	M2	Mean	M1	M2	Mean
		2006/2007			2007/2008		
				Fresh weight of leaves (g)			
Control		24.85	66.33	**45.59**	64.19	80.94	**72.57**
NPK at g/ pot	**1**	57.72	80.71	**69.22**	84.44	77.81	**81.13**
	2	56.30	54.66	**55.48**	67.47	76.35	**71.91**
	3	44.53	59.14	**51.83**	63.47	51.20	**57.33**
	4	47.34	32.04	**39.69**	59.98	45.44	**52.71**
NPK 1g + trace elements (ppm)	**50**	58.35	54.27	**56.31**	80.20	83.61	**81.91**
	100	59.01	68.00	**63.50**	77.90	65.60	**71.75**
Mean		**49.73**	**59.31**	**-----**	**71.09**	**68.71**	**-----**
LSD at 0.05 for:							
	(A)			**2.27**			**1.63**
	(B)			**4.24**			**3.05**
	(AB)			**6.00**			**4.32**
				Dry weight of leaves (g)			
Control		3.48	9.74	**6.61**	12.10	13.17	**12.64**
NPK at g/ pot	**1**	8.12	11.54	**9.83**	14.55	13.76	**14.16**
	2	8.56	8.62	**8.59**	11.35	13.51	**12.43**
	3	6.53	9.10	**7.82**	11.04	10.71	**10.87**
	4	6.72	4.54	**5.63**	10.40	9.00	**9.70**
NPK 1g+trace elements(ppm)	**50**	9.89	7.27	**9.49**	14.13	14.08	**14.11**
	100	8.85	10.13	**8.58**	13.70	11.54	**12.62**
Mean		**7.45**	**8.71**	**-----**	**12.47**	**12.25**	**------**
LSD at 0.05 for:							
	(A)					**0.47**	**0.54**
	(B)					**0.89**	**1.01**
	(AB)					**1.25**	**1.43**

Table 3. Effect of soil media, NPK fertilizers and trace elements on fresh and dry weights of leaves (g/ plant) of *Dracaena marginata* "Bicolor" at 2006/2007 and 2007/2008 seasons.

M1 = Peatmoss M2 = Peat + sand (1:1 by volume) Trace elements = Fe + Mn + Zn

Interaction between growing media and fertilizers had a significant effect on dry weight of leaves/plant in both seasons. The heaviest dry weight of leaves were obtained from the plants growing in peat+ sand and treated with 1 gm NPK/ plant in the first season, while in the second season the heaviest leaves dry weights were obtained due to growing plants in peatmoss and fertilized with NPK at 1 g/ plant. Whereas the lowest values were obtained from the plants

growing in peatmoss combined with unfertilized control in the first season, and from peat+ sand combined with NPK at 4 g/ plant and in the second season.

Total carbohydrates contents in leaves:

As shown in Table (4) plants grown in peatmoss gave the highest total carbohydrates contents when compared with peat: sand medium in the first and second seasons. These results are in harmony with those obtained by Saleh (2000) on *Ficus benjamina* " Starlight" grew plants in different planting media, and indicated that peatmoss + sand + clay mixture resulted in higher total content of carbohydrates. El-Khateeb *et al*. (2006) on *Ficus alii*, found that using the mixtures of (clay+ peatmoss +perlite).and (clay+ sand+ vermiculite) increased the total carbohydrates in the different parts.

All chemical fertilization treatments increased total carbohydrates contents in the leaves compared with control plants, except NPK at 3 and 4 g/ plant which decreased it in the first and second seasons. The best results were obtained from plants treated with NPK at 1 g +100 ppm trace elements in the first and second seasons.

Concerning the interaction between soil media and chemical fertilizers, plants grown in peatmoss and treated with NPK at 1 g +100 ppm trace elements gave the highest total carbohydrates contents in the first and second seasons. Whereas the lowest results were obtained from plants growing in peat + sand and treated with NPK at 4 g in the first season, and peatmoss combined with NPK at 4 g/ plant in the second one.

Elements percent:

– Nitrogen percent in leaves:

The results presented in Table (4) showed that peatmoss medium gave the highest N percentages compared with peat + sand medium in the first and second seasons.

Chemical fertilization treatments at 1 and 2g / plant increased nitrogen percent compared with control plants. Whereas NPK at 3 and 4 g/ plant treatments decreased nitrogen percent as compared with control in the first and second seasons. NPK at 1 g +100 ppm trace elements was the best treatment which gave the highest values in the first and second seasons. In contrast, the lowest values were obtained from plants fertilized with NPK at 4 g / plant in the first and second seasons.

Interaction between growing media and chemical fertilization showed that, the highest nitrogen percent were obtained from plants grown in peatmoss and fertilized with NPK at 1 g+100ppm trace elements in the first and second

Table 4. Effect of soil media, NPK fertilizers and trace elements on total carbohydrates and nitrogen (%) in leaves of *Dracaena marginata* "Bicolor" at 2006/ 2007 and 2007/ 2008 seasons.

Fertilization Treatments (B)		Soil media					
		M 1	M2	Mean	M1	M2	Mean
		2006/2007			2007/2008		
		Total carbohydrates (%)					
Control		33.82	32.41	**33.12**	31.72	30.50	**31.11**
NPK at g/ pot	**1**	35.39	34.24	**34.82**	39.23	35.47	**37.35**
	2	34.32	33.36	**33.84**	31.73	34.14	**32.94**
	3	29.38	28.81	**29.09**	29.58	30.13	**29.86**
	4	28.73	27.42	**28.08**	27.67	28.56	**28.12**
NPK 1g + trace elements (ppm)	**50**	36.12	35.24	**35.68**	39.59	37.56	**38.58**
	100	38.81	37.59	**38.20**	42.26	40.56	**41.41**
Mean		**33.79**	**32.72**	**----**	**34.54**	**33.85**	**----**
		Nitrogen (%)					
Control		1.512	1.453	**1.483**	1.589	1.524	**1.557**
NPK at g/ pot	**1**	1.700	1.672	**1.686**	2.457	2.316	**2.387**
	2	1.659	1.502	**1.581**	2.214	2.197	**2.206**
	3	1.351	1.268	**1.310**	1.483	1.352	**1.418**
	4	1.163	1.195	**1.179**	1.168	1.095	**1.132**
NPK 1g + trace elements (ppm)	**50**	1.718	1.695	**1.707**	2.620	2.605	**2.156**
	100	1.826	1.807	**1.817**	2.850	2.730	**2.790**
Mean		**1.561**	**1.513**	**----**	**2.054**	**1.974**	**----**

M1 = Peatmoss M2 = Peat + sand (1:1 by volume) Trace elements = Fe + Mn + Zn

seasons. Whereas the lowest values were obtained from plants grown in peatmoss and treated with 4 g NPK/ plant in the first season, and peat + sand combined with NPK at 4 g/ plant in the second season.

– Phosphorus percent in leaves:

As shown in Table (5) plants grown in peat + sand gave the highest phosphorus percent in the first and second seasons as compared with peatmoss medium.

All fertilization treatments increased phosphorus percent in the leaves compared with control plants in the first and second seasons, except 4 g NPK treatment which decreased it in the second season. The best result was obtained

from 1 g NPK +100 ppm trace elements and NPK at 1 g + 50 ppm trace elements in the first and second seasons, respectively.

Interaction between growing media and chemical fertilization showed that, peat+ sand medium combined with NPK at 1 g +100 ppm trace elements was the best treatment in the first and second seasons. Whereas the lowest results were obtained from plants grown in peat: sand medium and treated with NPK at 4 g/ plant in both seasons.

- Potassium percent in leaves

The data in Table (5) showed that peatmoss medium gave the highest K contents in the first and second seasons as compared with peat + sand medium.

Chemical fertilization treatments increased potassium contents in the leaves compared with control plants in the first season, except NPK at 4 g treatment which decreased it. In the second season, all the treatments increased potassium contents compared to control, except NPK at 2 g and NPK at 1 g +100 ppm trace elements treatments which decreased it.

Interaction between growing media and chemical fertilization showed that, the highest potassium contents were obtained from plants grown in peatmoss and treated with NPK at 1 g alone or combined with 50 ppm trace elements in the first and second seasons, respectively. Whereas the lowest values were obtained from plants growing in peat+ sand and treated with NPK at 4 g /plant and NPK 1 g +50 ppm trace elements in the first and second seasons, respectively.

- Iron percent in leaves:

The data presented in Table (6) showed that, plants growing in peatmoss had the highest Fe percent as compared with peat+ sand medium which gave the lowest values in the first and second seasons.

All fertilization treatments increased iron contents in leaves compared with control plants, except 4 gm NPK treatment which decreased it in the first and second seasons. The best result was obtained from 1 g NPK+100 ppm trace elements, while the lowest value was obtained from 4 g NPK/ plant in both seasons.

Interaction between growing media and chemical fertilization showed that peatmoss medium combined with 1 g NPK+100 ppm trace elements gave the highest Fe contents in leaves in the first and second seasons. Whereas the lowest values were obtained from plants grown in peat + sand and fertilized with NPK at 4 g / plant in first and second seasons.

Table 5. Effect of soil media, NPK fertilizers and trace elements on phosphorus and potassium (%) in the leaves of *Dracaena marginata* "Bicolor" at 2006/2007 and 2007/2008 seasons.

Fertilization Treatments (B)		Soil media					
		M 1	M2	Mean	M1	M2	Mean
		2006/2007			2007/2008		
				Phosphorus (%)			
Control		0.129	0.120	0.125	0.152	0.145	**0.149**
NPK at g/ pot	**1**	0.181	0.176	0.179	0.270	0.265	**0.268**
	2	0.263	0.259	0.261	0.315	0.390	**0.353**
	3	0.149	0.138	0.144	0.270	0.281	**0.276**
	4	0.530	0.089	0.309	0.142	0.136	**0.139**
NPK1g+ trace elements(ppm)	**50**	0.135	0.129	0.132	0.411	0.405	**0.408**
	100	0.163	1.179	0.671	0.323	0.449	**0.386**
Mean		**0.221**	**0.299**	**----**	**0.269**	**0.296**	**----**
				Potassium (%)			
Control		0.575	0.565	**0.570**	1.470	1.356	**1.413**
NPK at g/ pot	**1**	1.125	1.106	**1.116**	2.020	1.930	**1.975**
	2	0.950	0.757	**0.854**	2.400	0.220	**1.310**
	3	0.847	0.820	**0.834**	2.450	2.310	**2.380**
	4	0.564	0.469	**0.517**	1.720	1.640	**1.680**
NPK g+ trace elements (ppm)	**50**	0.717	0.657	**0.687**	2.750	2.569	**2.659**
	100	0.762	0.720	**0.741**	1.940	0.210	**1.075**
Mean		**0.791**	**0.728**	**----**	**2.107**	**1.462**	**----**

M1 = Peatmoss M2 = Peat + sand (1:1 by volume) Trace elements = Fe + Mn + Zn

– Manganese (%) in leaves:

As shown in Table (6) plants grown in peatmoss medium gave the highest Mn percent in leaves as compared with peat+ sand medium which gave the lowest values in first and second seasons.

All fertilization treatments increased manganese percent in leaves as compared with control plants, except NPK at 4 g treatment which decreased it in the first and second seasons. The best result was obtained from NPK at 1 g +100 ppm trace elements, while the lowest value was obtained from plants treated with NPK at 4 g/ plant in the first and second seasons.

Interaction between peatmoss growing media and NPK at 1 g +100 ppm trace elements gave the highest Mn contents in leaves in the first and second

Table 6. Effect of soil media, NPK fertilizers and trace elements on iron, manganese and zinc % (ppm) in the leaves of *Dracaena marginata* "Bicolor" at 2006/2007 and 2007/2008 seasons.

Fertilization Treatments (B)		Soil media					
		M 1	M2	Mean	M1	M2	Mean
		2006/2007			2007/2008		
				Iron % (ppm)			
Control		161.2	157.8	**159.5**	171.8	165.0	**168.4**
NPK at g/ pot	**1**	278.0	269.2	**273.6**	223.0	220.7	**221.9**
	2	285.0	267.0	**276.0**	248.8	237.0	**242.9**
	3	190.9	175.2	**183.1**	210.0	213.8	**211.9**
	4	141.3	132.6	**136.9**	159.3	152.0	**155.7**
NPK 1g+ trace elements(ppm)	**50**	394.2	312.9	**353.6**	400.0	392.8	**396.4**
	100	412.2	370.5	**391.4**	441.4	425.1	**433.1**
Mean		**266.1**	**240.7**	----	**264.9**	**258.1**	----
				Manganese % (ppm)			
Control		161.0	160.0	**160.5**	165.0	163.8	**164.4**
NPK at g/ pot	**1**	190.2	187.8	**189.0**	194.5	190.3	**192.4**
	2	184.0	186.0	**185.0**	186.7	181.0	**183.9**
	3	199.2	189.0	**194.1**	201.0	197.2	**199.1**
	4	153.0	142.0	**147.5**	157.0	148.3	**152.7**
NPK 1g+trace elements (ppm)	**50**	243.0	241.8	**242.4**	249.0	246.0	**247.5**
	100	250.0	247.2	**248.6**	255.2	250.0	**252.6**
Mean		**197.2**	**193.4**	----	**201.2**	**196.7**	----
				Zinc % (ppm)			
Control		**175.0**	**188.7**	**181.9**	**193.0**	**185.0**	**189.0**
NPK at g/ pot	**1**	**237.7**	**221.6**	**229.7**	**242.0**	**232.0**	**237.0**
	2	**246.8**	**239.0**	**242.9**	**217.0**	**206.0**	**211.5**
	3	**373.0**	**344.1**	**358.6**	**256.0**	**231.0**	**243.5**
	4	**188.0**	**178.0**	**183.0**	**176.0**	**153.0**	**164.5**
NPK 1g+trace elements(ppm)	**50**	**480.5**	**468.2**	**474.4**	**429.0**	**448.0**	**438.5**
	100	**542.0**	**536.8**	**539.4**	**496.7**	**468.0**	**482.4**
Mean		**320.4**	**310.9**	----	**287.1**	**274.7**	----

M1 = Peatmoss M2 = Peat + sand (1:1 by volume) Trace elements = Fe + Mn + Zn

seasons. Whereas the lowest results were obtained from plants grown in peat + sand and treated with NPK at 4 gm/plant in the first and second seasons.

– Zinc percent in leaves:

The results presented in Table (6) showed that, peatmoss medium gave the highest zinc percent in leaves as compared with peat+ sand medium in the first and second seasons. Some authors declared the importance of potting substrates in increasing the availability of nutrient elements and enhancing their absorption by plant such as Saleh (2000) on *Ficus benjamina* "Starlight" grew plants in different planting media, and indicated that peatmoss + sand + clay mixture resulted in higher N, P and K in the leaves. Gad (2003) on *Ficus benjamina* found that the peatmoss alone and its mixture with clay or vermiculite (1:1 v/v) significantly increased N, P and K percent in the leaves.

Chemical fertilization treatments increased zinc contents in leaves as compared with control plants in the first season, while in the second season; all the treatments increased it compared to control, except NPK at 4 g treatment which decreased it. The best results were obtained from 1 g NPK+100 ppm trace elements in the first and second seasons. In contrast, the lowest values were obtained from control and NPK at 4 g in the first and second seasons, respectively. Similar results were obtained by Dorgham (2005) on *Dieffenbachia* and *Philodendron* plants; Srinivasa (2006) on *Anthurium andraeanum*, they showed that NPK fertilization significantly affected N, P, K, Ca and Mg contents.

Concerning the interaction between growing media and chemical fertilization the data showed that, peatmoss medium combined with NPK at 1 g +100 ppm trace elements gave the best results in the first and second seasons. Whereas the lowest values were obtained from control plants growing in peatmoss in the first season, and plants growing in peat + sand and treated with 4 g NPK/ plant in the second season.

Recommendation:

To obtain the best results on vegetative growth, and chemical composition of *Dracaena marginata* plants, we recommended the use of peatmoss or peat + sand media and fertilized with NPK at 1 g alone or combined with trace elements (Fe, Mn and Zn) at 50 or 100 ppm monthly.

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تأثير بيئات النمو والتسميد الكيماوي علي النمو والتركيب الكيماوي لنبات الدراسينا مارجيناتا "BICOLOR"

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اجري هذا البحث بمزرعة قسم الزينة – كلية الزراعة - جامعة القاهرة خلال موسمين ٢٠٠٧، ٢٠٠٨ بهدف دراسة تأثير أوساط الزراعة (بيت موس أو بيت موس + رمل بنسبة ١:١)، وتأثير التسميد ب NPK بمعدل صفر ، ١ ، ٢ ، ٣ ، ٤ جرام/ نبات/ شهر وكذلك الرش بالعناصر الصغرى (الحديد ، المنجنيز والزنك) بتركيز ٥٠ ، ١٠٠ جزء في المليون علي النمو والتركيب الكيماوي لنبات الدراسينا *Dracaena marginata* 'Bicolor' وأوضحت النتائج ما يلي:

أدي استخدام البيت موس كبيئة للزراعة إلي الحصول علي أعلي القيم من حيث ارتفاع النبات وعدد الأوراق/ نبات، والوزن الطازج والجاف/ نبات ومحتوي الأوراق من الكربوهيدرات، النتروجين والبوتاسيوم والحديد والمنجنيز والزنك. بينما أدي استخدام البيت موس + الرمل إلي الحصول علي اعلي القيم من حيث سمك الساق ومحتوي الأوراق من الفوسفور في كلا الموسمين.

أدي التسميد بالنتروجين والفوسفور والبوتاسيوم بمعدل ١ ، ٢ جرام/ نبات وأيضا التسميد بالنتروجين والفوسفور والبوتاسيوم بمعدل ١ جرام + الرش بالعناصر الصغرى إلي زيادة ارتفاع النبات، وسمك الساق، وعدد الأوراق/ نبات ومساحة الورقة والوزن الطازج والجاف للأوراق في كلا الموسمين. أيضا أدت جميع المعاملات السمادية إلي زيادة محتوي الأوراق من الكربوهيدرات، النتروجين و، والفوسفور ، والبوتاسيوم ، والحديد ، والمنجنيز والزنك مقارنة بالنباتات غير المعاملة في كلا الموسمين.

أدي التأثير المتداخل لاستخدام بيئات الزراعة (البيت موس أو البيت موس + الرمل) مع التسميد بالنتروجين والفوسفور والبوتاسيوم بمعدل ١ جرام/ نبات بمفرده أو مع الرش بالعناصر الصغرى إلي الحصول علي أعلي القيم.