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PROPAGATION OF *DRACAENA FRAGRANS* AS AFFECTED BY CUTTING THICKNESS AND AUXIN TREATMENTS

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ABSRACT: Different cutting thickness (3.0, 4.0 or 5.0 ± 0.2 cm) of *Dracaena fragrans* were treated with different concentrations (0, 1500 or 2000 ppm) of IAA or IBA. Using of the highest cutting thickness or IBA treatments had a positive effect on most of root and shoot recorded characters, while the lowest cutting thickness or IAA treatments increased root length and plant height. The highest number of roots /cutting and root fresh and dry weight were obtained when the highest cutting thickness was treated with 2000 ppm IBA, whereas the highest number of sprouted buds /cutting, number of leaves /plant and shoot fresh weight were obtained by treating this cutting with 1500 ppm IBA.

Key words: *Dracaena fragrans*, propagation, cutting thickness indoleacetic acid (IAA), indolebutyric acid (IBA).

INTRODUCTION

Dracaena fragrans (corn plant) is a popular house plant; it can grow in wide range of conditions, from full sun to low interior light conditions. It is a drought tolerant plant and suitable for low-maintenance container culture or specimen planting. Extremely fragrant flowers are occasionally produced and open during the night (Griffith, 1998).

This plant usually propagated by tip cuttings or cane pieces, but air layers of smaller cane pieces are also sometimes used (Griffith, 1998). Propagation by cuttings has numerous advantages. It is inexpensive, rapid, simple and dose not require the special technique necessary in micropropagation (Hartmann *et al.*, 2006). One of the most important problems encountered the propagation of corn plant by leafless stem sections (cuttings) is that this method is somewhat slow and may require several weeks or months (Thomas, 1999). Therefore, the present study was designed to study the effect of using different

cutting thickness, auxin treatments (IBA and IAA) and their interactions on root and shoot characters of *Dracaena fragrans* cuttings, aiming to of improve the propagation efficiency of this plant by cutting.

MATERIALS AND METHODS

This work was carried out during the two successive seasons of 2005 and 2006 under the lathe-house conditions of Efficient Productivity Institute, Zagazig University, Egypt, to study the effect of different cutting thickness, auxin treatments and their interaction on rooting and shooting growth characters of *Dracaena fragrans* plant.

The experiment included 15 treatments, which were the combinations between three cutting thickness (3.0, 4.0 or 5.0 ± 0.2 cm) and different concentrations (0, 1500 or 2000 ppm) of IBA and IAA. This experiment was designed as factorial experiment between the above mentioned cutting thickness and auxin levels in a complete randomized block design with three replicates, each replicate contained five pots.

Canes (stems without leaves) which were utilized in this experiment were obtained on March 15th, for both tested seasons, from 12 years old *Dracaena fragrans* stock plants grown under open field conditions in a private nursery located near Zagazig Town, Sharkia Governorate. These plants were with the same age and grown under the same conditions. Canes were pre-measured, starting from the apex, so that, each one had about 165 cm. Then, canes were cut by using electrical circular saw to cane pieces (cuttings) each one had about 15 cm length. Cuttings were categorized into three different groups according to their thickness (3.0, 4.0 or 5.0 ± 0.2 cm) for using in this experiment (Fig. 1).

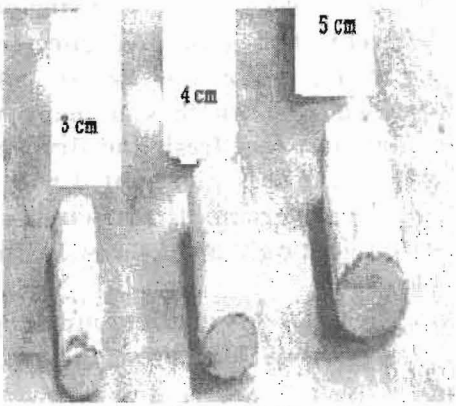

Fig.1. *Dracaena fragrans* cuttings with different thickness prepared for culture

Cutting bases (5.0 cm) of each thickness were dipped in different auxin treatments for one minute. Then, cuttings were planted in 20 cm plastic pots, one cutting / pot, filled with a mixture of German peat moss + sand (1: 1, V/ V). The chemical and physical properties of the used potting mixture were as follows: 35.3% coarse sand, 9.1% fine sand, 6.8 % silt, 1.6% clay, 47.2% organic matter, 0.25% total N, 0.88% total P,

1.52% total K, EC 2.2 dS m^{-1} and 7.2 pH. Pots were maintained in the lathe-house conditions with air temperature ranged from 25 to 30 °C, relative humidity between 70 to 85%.

Throughout the experimental period for the two seasons, pots were overhead irrigated whenever needed. Also, rooted and sprouted cuttings of all treatments were foliar sprayed monthly with a solution contained 1 g l-1 of Delta Spray fertilizer (19% N, 16% P2O5, 20% K2O, 4% Mg, trace elements; viz., B 0.25%, Mo 0.0005%, and Cu 0.01%) for enhancing plant growth.

Recorded Data:

Rooting data included: number of days to first root appearance was determined by checking cuttings of all treatment for root appearance every three days, and then cuttings which initiated root were marked to avoid check again to prevent root growth interruption. Additionally, on September 1st for the two seasons the following rooting data were recorded: rooting (%), No. of roots / cutting, root length (expressed as the tallest root length on cutting in centimeters), root thickness (was measured at the base end of roots in centimeters), and root fresh and dry weights/ cutting (g).

Shoot growth data were recorded at the end of experiment (September 1st for the two growing seasons) and implicated: No. of sprouted buds/ cutting, No. of leaves / plant and shoot fresh and dry weights/ plant. Also, plant height was measured from the top rim of the pot to the upper end of the tallest leaf (cm).

Statistical Analysis:

The obtained data were statistically analyzed according to Steel and Torrie (1980) and the means were compared using Duncan's multiple range test at 5% level (Duncan, 1958).

RESULTS

Effect of Cutting Thickness, Auxin Treatments and Their Interaction on Rooting Percentage of *Dracaena fragrans* Cutting

The main effect of cutting thickness declares that rooting percentage was gradually decreased with increasing cutting thickness. The highest rooting percentage (93 and 94 %) was recorded with the lowest cutting thickness (3.0 cm diameter) during both seasons, respectively (Table 1).

Main effect of auxin treatments shows that using IAA or IBA at both concentrations (1500 and 2000 ppm) significantly increased the rooting percentage without significantly differences between high and low concentration of each auxin. It was also cleared that IBA was more effective than IAA at both concentrations.

Among the different interaction treatments between cutting thickness and auxin treatments, cuttings with 3.0 or 4.0 cm diameter treated with 1500 or 2000 ppm IBA gave the highest rooting percentages (100%) during both seasons.

Table 1. Effect of cutting thickness, auxins and their interaction treatments on rooting percentage, number of days to first root appearance, number of roots/cutting and average root thickness on *Dracaena fragrans* cutting during 2005 and 2006 seasons

Cutting thickness (cm)	First season						Second season					
	Auxin treatments (ppm)						Auxin treatments (ppm)					
	0.0	1500 IAA	2000 IAA	1500 IBA	2000 IBA	Mean	0.0	1500 IAA	2000 IAA	1500 IBA	2000 IBA	Mean
						Rooting %						
3.0 ± 0.2	77 a	94 a	94 a	100 a	100 a	93 A	83 c	88 bc	100 a	100 a	100 a	94 A
4.0 ± 0.2	66 a	88 a	94 a	100 a	100 a	89 A	60 de	83 c	94 ab	100 a	100 a	87 B
5.0 ± 0.2	60 a	71 a	83 a	94 a	94 a	80 B	55 e	66 d	88 bc	100 a	100 a	82 C
Mean	68 C	84 B	90 AB	98 A	98 A		66 C	79 B	94 A	100 A	100 A	
						Number of days to first root appearance						
3.0 ± 0.2	19.0 a	16.8 a	16.3 a	13.8 a	13.2 a	15.8 B	19.8 a	18.1 a	18.2 a	14.8 a	13.9 a	16.9 B
4.0 ± 0.2	19.6 a	17.1 a	14.6 a	16.0 a	13.0 a	16.2 B	23.1 a	17.8 a	15.1 a	14.1 a	18.0 a	17.6 B
5.0 ± 0.2	24.3 a	25.0 a	21.6 a	20.6 a	21.1 a	22.5 A	27.9 a	24.2 a	22.0 a	18.9 a	21.3 a	22.8 A
Mean	21.0 A	19.6 A	17.5 B	16.8 B	16.0B		23.6 A	20.0 B	18.4 AB	15.9 B	17.7 AB	
						Number of roots / cutting						
3.0 ± 0.2	12.1d-g	12.7 c-g	14.3 b-f	15.3 b-e	15.5 b-e	14.0 B	12.2 g	12.5 g	12.9 fg	15.9 ef	16.8 e	14.1 B
4.0 ± 0.2	8.0 g	10.7 efg	8.53 fg	23.7 a	19.1 ab	14.0 B	10.2 g	11.4 g	12.3 g	18.4 cde	20.6 ad	14.6 B
5.0 ± 0.2	18.7 abc	16.8 b-e	16.4 b-e	17.4 bcd	20.0 ab	17.8 A	17.3 de	19.4 b-e	23.6 a	20.9 abc	22.5 ab	20.7 A
Mean	12.9 B	13.4 B	13.0 B	18.8 A	18.2 A		13.2 C	14.4 C	16.3 B	18.4 A	20.0 A	
						Average root thickness (cm)						
3.0 ± 0.2	0.35 g	0.37 fg	0.52 def	0.63 a-d	0.76 a	0.52 B	0.35 f	0.38 ef	0.44 c-f	0.83 a	0.68 a-b	0.53 A
4.0 ± 0.2	0.38 fg	0.69 ab	0.51 def	0.59 b-e	0.47 efg	0.53 B	0.41 def	0.67 ab	0.59 bcd	0.60 bcd	0.58 bcd	0.57 A
5.0 ± 0.2	0.53 cde	0.62 a-e	0.58 b-e	0.68 abc	0.63 a-d	0.61 A	0.59 bcd	0.56 b-e	0.60 bcd	0.65 abc	0.75 ab	0.63 A
Mean	0.42 C	0.56A B	0.53 B	0.63 A	0.62 A		0.45 B	0.53 B	0.54 B	0.69 A	0.67 A	

Means having same alphabetical letter(s) within each column did not significantly differ according to Duncan's multiple range test at 5% level. Capital letters are for main effects, while small litters for interaction means.

Effect of Cutting Thickness, Auxin Treatments and Their Interaction on Number of Days to First Root Appearance on *Dracaena fragrans* Cutting

Table 1 shows that the number of days to first root appearance was gradually decreased with decreasing cutting thickness. The minimum days to first root appearance (15.8 and 16.9 days) was recorded with the lowest cutting thickness (3.0 cm) during both seasons, respectively, without significant differences between 3.0 and 4.0 cm cutting diameter.

Main effect of auxin treatments suggested that treating the cuttings with IAA or IBA decreased the number of days to first root appearance. In this regard, IBA was slightly effective than IAA.

The effect of interaction between cutting thickness and auxin treatments was not significant. However, the least number of days to first root appearance was recorded with the combination of 3.0 cm cutting thickness and 2000 ppm IBA treatment.

Effect of Cutting Thickness, Auxin Treatments and Their Interaction on Number of Roots/Cutting of *Dracaena fragrans*

The main effect of cutting thickness indicates that the highest cutting thickness (5.0 cm diameter) surpassed the other cutting thickness (3.0 and 4.0 cm diameter) concerning the number of roots/cutting (Table 1 and Fig. 2). Also, it is clear that IBA was more effective than IAA and control treatment. On the other side, number of roots/cutting did not significantly increased with IAA compared with control treatment in most cases (Table 1).

The interaction between different cutting thickness and auxin treatment shows that treating of 4.0 or 5.0 cm cutting diameter with IBA at both concentrations (1500 and 2000 ppm) gave the highest number of roots/ cutting (Fig. 2).

Effect of Cutting Thickness, Auxin Treatments and Their Interaction on Average Root Thickness of *Dracaena fragrans* Cutting

The obtained results (Table 1) show that increasing the cutting thickness resulted in gradually increasing in average root thickness: since the highest root thickness (0.61 and 0.63 cm) were recorded with the highest cutting thickness (5.0 cm diameter) during both seasons, respectively.

Treating of cuttings with IBA resulted in increasing the root thickness, without significant differences between 1500 or 2000 ppm concentrations.

Among different combinations of cutting thickness and auxin treatments, the highest averages of root thicknesses (0.76 and 0.83 cm) were recorded with the lowest cutting thickness combined with

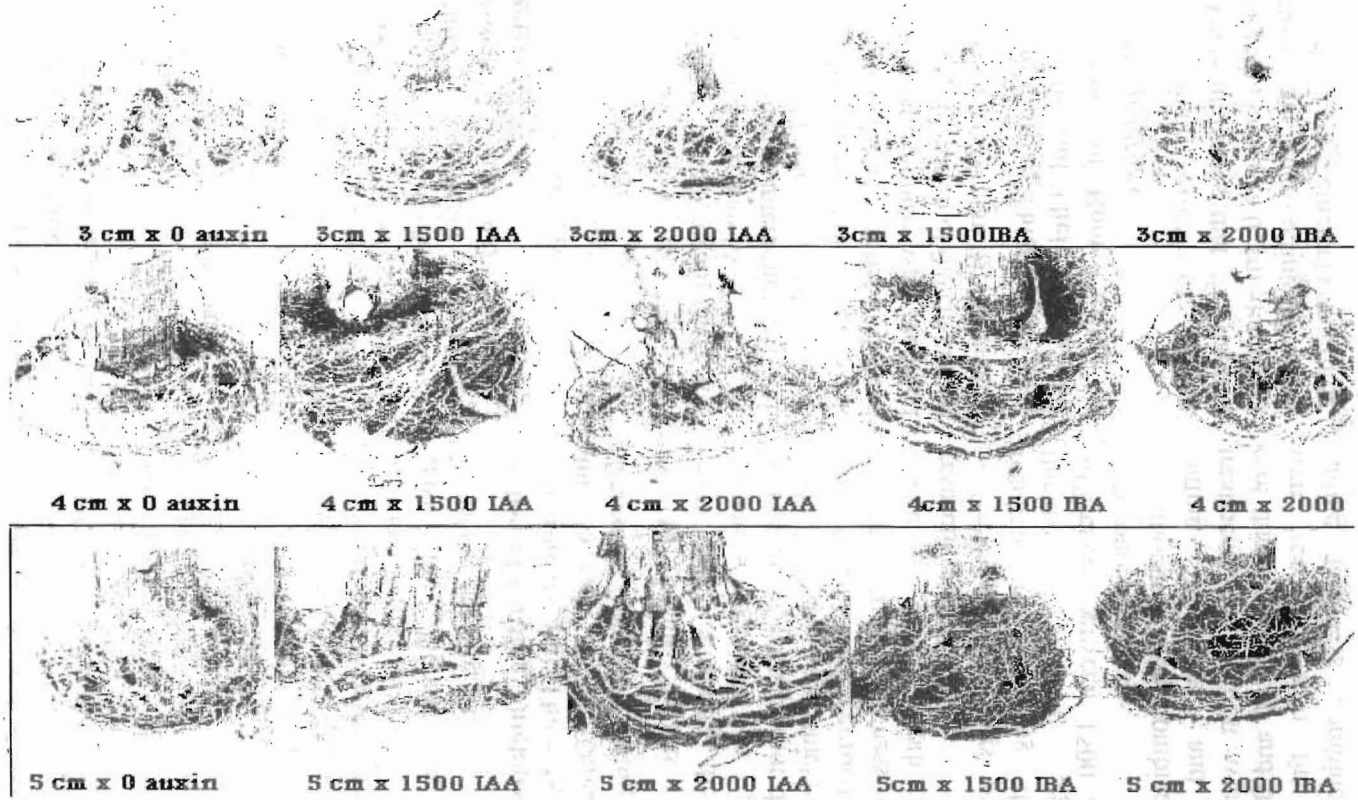

Fig. 2. Rooted cuttings of *Dracaena fragrans* with different thickness (3.0, 4.0 or 5.0 ± 0.2 cm) as affected by different auxin treatments (IAA or IBA at 0, 1500 or 2000 ppm) after 5.5 months from culture

2000 and 1000 ppm IBA during both seasons, respectively.

Effect of Cutting Thickness, Auxin Treatments and Their Interaction on Root Length of *Dracaena fragrans* Cutting

Data in Table 2 show that increasing cutting thickness was resulted in increments in root length. Generally, auxin treatments tended to increase root length. However, the interaction treatments indicated that the highest root length (88.4 and 69.0 cm) were belong to the medium cutting thickness treated with 1500 ppm IAA (Fig. 2).

Effect of Cutting Thickness, Auxin Treatments and Their Interaction on Root Fresh and Dry Weights / Plant of *Dracaena fragrans*

The main effect of cutting thickness (Table 2) proved the benefit of using the highest cutting thickness (5.0 cm diameter) for obtaining the highest fresh or dry weights of roots/plant (60.4 and 58.1 or 15.3 and 14.9 g during both seasons, respectively).

Auxin treatments were effective in increasing root fresh or dry weights/plant. IBA was more effective than IAA in this respect.

The interaction between cutting thickness and auxin treatments shows that the highest root fresh weights (77.6 and 71.5 g/plant) were recorded when the highest cuttings thicknesses were treated with higher IBA concentration (2000 ppm) during both seasons, respectively (Table 2).

Effect of Cutting Thickness, Auxin Treatments and Their Interaction on Number of Sprouted Buds/Cutting and Shoot Growth of *Dracaena fragrans*

The main effect of cutting thickness indicates that the highest cutting thickness produced the highest significant number of sprouted buds/cutting, number of leaves/plant and shoot fresh and dry weights, while using the lowest cutting thickness significantly increased the plant height (Tables 3 and 4).

Concerning the main effect of auxin, it was found that auxin treatments did not significantly affect the number of sprouted buds/cutting, whereas plant height was significantly increased by IAA at 1500 or 2000 ppm. The number of leaves/plant was slightly increased due to auxin treatments. However, the highest shoot fresh and dry weights were recorded with 1500 or 2000 ppm IBA (Tables 3 and 4).

The interaction effect between cutting thickness and auxin treatments (Tables 3 and 4) indicates that treating the highest cutting thickness (5.0 cm diameter) with low concentration of IBA (1500 ppm) produced the highest values of number of sprouted buds/cutting (2.83 and 2.70 bud), number of leaves/plant (31.9 and 32.7 leaf) and shoot fresh weight/plant (169.7 and 181.5 g)

Table 2. Effect of cutting thickness, auxins and their interaction treatments on root length, and root fresh and dry weights/ plant of *Dracaena fragrans* during 2005 and 2006 seasons

Cutting thickness (cm)	First season						Second season					
	Auxin concentration (ppm)						Auxin concentration (ppm)					
	0.0	1500 IAA	2000 IAA	1500 IBA	2000 IBA	Mean	0.0	1500 IAA	2000 IAA	1500 IBA	2000 IBA	Mean
Root length (cm)												
3.0 ± 0.2	37.3 f	60.6 cde	47.5 def	35.7 f	60.4 cde	48.3 B	38.3 f	58.2 bcd	62.3 abc	53.0 cde	55.1 cd	53.4 B
4.0 ± 0.2	78.7 ab	88.4 a	73.2 abc	52.1 def	43.4 ef	67.1 A	65.6 ab	69.0 a	58.9 bcd	51.8 de	45.5 ef	58.2 A
5.0 ± 0.2	40.3 f	50.6 def	45.9 def	63.6 bcd	63.0 bcd	52.7 B	55.5 cd	54.7 cd	55.2 cd	65.5 ab	58.4 bcd	57.8 A
Mean	52.1 B	66.5 A	55.5 B	50.4 B	55.6 B		53.1 B	60.7 A	58.8 A	56.8 AB	53.0 B	
Root fresh weight/ plant (g)												
3.0 ± 0.2	21.1 d	25.1 d	32.6 cd	60.0 b	75.0 ab	42.8 B	20.9 f	30.2 ef	27.3 f	67.1 ab	61.5 ab	41.4 B
4.0 ± 0.2	17.5 d	69.0 ab	21.9 d	43.2 c	42.8 c	38.9 B	23.4 f	58.4 bc	31.1 ef	49.3 cd	47.9 d	42.0 B
5.0 ± 0.2	41.8 c	44.6 c	74.4 ab	63.4 ab	77.6 a	60.4 A	44.5 d	39.3 de	70.8 a	64.1 ab	71.5 a	58.1 A
Mean	26.8 D	46.2 C	43.0 C	55.5 B	65.1 A		29.6 C	42.6 B	43.0 B	60.1 A	60.3 A	
Root dry weight/ plant (g)												
3.0 ± 0.2	4.06 f	5.95 ef	8.57 de	16.9 ab	18.6 a	10.8 B	3.41 g	6.58 ef	6.57 ef	15.9 ab	16.4 ab	9.77 C
4.0 ± 0.2	5.83 ef	8.42 de	11.7 cd	17.8 ab	14.6 bc	11.7 B	5.57 f	11.0 c	8.67 de	16.0 ab	14.5 b	11.1 B
5.0 ± 0.2	10.5 d	10.5 d	17.3 ab	19.2 a	19.0 a	15.3 A	10.7 cd	11.3 c	17.5 a	17.2 a	18.0 a	14.9 A
Mean	6.81 C	8.29 C	12.5 B	18.0 A	17.4 A		6.56 D	9.65 C	10.9 B	16.4 A	16.3 A	

Means having same alphabetical letter(s) within each column did not significantly differ according to Duncan's multiple range test at 5% level Capital letters are for main effects, while small litters for interaction means

Table 3. Effect of cutting thickness, auxins and their interaction treatments on number of sprouted buds/plant, plant height and number of leaves/plant of *Dracaena fragrans* during 2005 and 2006 seasons

Cutting thickness (cm)	First season						Second season					
	Auxin concentration (ppm)						Auxin concentration (ppm)					
	0.0	1500 IAA	2000 IAA	1500 IBA	2000 IBA	Mean	0.0	1500 IAA	2000 IAA	1500 IBA	2000 IBA	Mean
						Number of sprouted buds/ cutting						
3.0 ± 0.2	1.60 a	1.88 a	1.49 a	1.53 a	1.56 a	1.61 B	1.53 a	1.55 a	1.57 a	1.49 a	1.46 a	1.52 B
4.0 ± 0.2	1.49 a	1.59 a	1.50 a	1.66 a	1.65 a	1.58 B	1.58 a	1.63 a	1.72 a	1.55 a	1.55 a	1.60 B
5.0 ± 0.2	2.50 a	2.53 a	2.23 a	2.83 a	2.66 a	2.55 A	2.60 a	2.61 a	2.50 a	2.70 a	2.67 a	2.61 A
Mean	1.86 A	2.00 A	1.74 A	2.01 A	1.96 A		1.90 A	1.93 A	1.93 A	1.91 A	1.89 A	
						Plant height (cm)						
3.0 ± 0.2	55.2 f	79.6 ad	93.2 a	86.1 abc	85.7 abc	79.9 A	60.4 d	59.1 d	89.9 a	83.1 a	79.6 ab	75.0 A
4.0 ± 0.2	62.6 d-f	87.2 ab	74.1 a-f	64.6 def	59.0 ef	69.5 B	66.7 cd	87.7 a	78.1 abc	65.1 d	62.6 d	72.0 A
5.0 ± 0.2	68.9 b-f	80.6 a-d	66.0 c-f	76.4 a-e	66.1 c-f	71.6 B	71.4 bcd	89.5 a	66.7 cd	58.6 d	69.2 bcd	71.6 A
Mean	62.2 C	82.5 A	77.7A B	75.7A B	70.3B C		66.2 B	78.8 A	78.2 A	69.9 B	70.4 B	
						Number of leaves/ plant						
3.0 ± 0.2	21.9 a	22.3 a	17.7 a	25.5 a	23.7 a	22.1 B	22.0 a	25.7 a	27.3 a	25.4 a	26.0 a	25.3 B
4.0 ± 0.2	20.3 a	26.5 a	17.5 a	24.0 a	24.3 a	22.5 B	19.7 a	29.3 a	23.9 a	29.0 a	27.4 a	25.8 B
5.0 ± 0.2	30.1 a	23.6 a	30.3 a	31.9 a	30.7 a	29.3 A	27.6 a	28.1 a	29.2 a	32.7 a	31.3 a	29.8 A
Mean	24.1 A	24.1 A	21.8 A	27.0 A	26.2 A		23.1 B	27.1 A	26.8 A	29.0 A	28.2 A	

Means having same alphabetical letter(s) within each column did not significantly differ according to Duncan's multiple range test at 5% level. Capital letters are for main effects, while small litters for interaction means.

Table 4. Effect of cutting thickness, auxins and their interaction treatments on fresh and dry weights of *Dracaena fragrans* plant during 2005 and 2006 seasons

Cutting thickness (cm)	First season						Second season					
	Auxin concentration (ppm)						Auxin concentration (ppm)					
	0.0	1500 IAA	2000 IAA	1500 IBA	2000 IBA	Mean	0.0	1500 IAA	2000 IAA	1500 IBA	2000 IBA	Mean
	Shoot fresh weight/ plant (g)											
3.0 ± 0.2	60.2 f	104.6 cde	129.4 bc	166.5 ab	115.3 cd	115.1 B	78.3 g	114.7 ef	157.9 a-d	145.9 cde	126.6 def	124.7 B
4.0 ± 0.2	83.0 def	139.1 abc	70.7 ef	138.2 abc	119.0 cd	110.0 B	95.9 fg	134.1 de	127.8 def	148.6 b-e	137.7 de	128.9 B
5.0 ± 0.2	133.2 abc	91.4 def	138.1 abc	169.7 a	165.9 ab	139.7 A	142.8 cde	124.8 def	175.3 abc	181.5 a	179.5 ab	160.8 A
Mean	92.1 D	111.7 C	112.7 C	157.9 A	133.4 B		105.7 C	124.5 B	153.7 A	158.7 A	148.0 A	
	Shoot dry weight/ plant (g)											
3.0 ± 0.2	15.5 e	25.6 cd	19.1 bc	30.2 abc	31.1 abc	26.3 B	13.8 g	23.7 f	28.6 de	32.1 a-d	26.8 ef	25.0 C
4.0 ± 0.2	16.5 e	28.2 bc	16.1 e	31.8 abc	30.2 abc	24.6 B	16.8 g	26.8 ef	30.6 cd	33.9 abc	35.6 a	28.7 B
5.0 ± 0.2	21.3 de	29.3 bc	30.8 abc	33.3 ab	37.3 a	30.4 A	26.2 ef	31.3 bcd	33.7 abc	34.9 ab	34.8 ab	32.2 A
Mean	17.8 C	27.7 B	25.3 B	31.8 A	32.9 A		18.9 D	27.3 C	31.0 B	33.6 A	32.4 AB	

Means having same alphabetical letter(s) within each column did not significantly differ according to Duncan's multiple range test at 5% level. Capital letters are for main effects, while small litters for interaction means.

during both seasons, respectively. While the highest plant height (93.2 and 89.9 cm) was recorded with the lowest cutting thickness treated with high concentration of IAA (2000 ppm) during both seasons, respectively. It is worth to mention that there was no significant effect for the interaction between cutting thickness and auxin treatments on number of sprouted buds/cutting and number of leaves/plant. Concerning shoot dry weight, it was observed in most cases that the highest values were recorded when cuttings with different thickness were treated with IBA at both concentrations and with combination between the highest cutting thickness and the highest IAA concentration (Fig. 3).

DISCUSSION

Effect of *Dracaena fragrans* Cutting Thickness on Root Initiation and Development

The results in current study suggested that roots were initiated more rapidly and easier on thinner (3.0 or 4.0 ± 0.2 cm) cuttings, since rooting percentage was higher and number of days to first root appearance was decreased with using thinner cuttings. This result agreed with those obtained by Conover and Poole (1992) on *Dracaena fragrans* 'Massangeana', Tofanelli *et al.* (2004) on peach cuttings, and Agbo and Obi (2007) on *Gongronema latifolia* cuttings. This may be attributed to that thicker cutting is more lignified than thinner one. This sheath of lignified tissue in stem may in some cases act as a mechanical barrier to root emergence (Hartmann *et al.* 2006). Another assumed reason is that thinner cutting has more cells capable of becoming meristematic. On the other hand, it was recorded in herein work that number of roots and root development were better with thicker cuttings (5.0 ± 0.2 cm). Similar result was reported by Hamilton *et al.* (2002) on coleus plant. Hartmann *et al.* (2006) declared that basal parts of stem generally make the best cuttings, this may be due to that these cuttings have an ample supply of stored carbohydrates to nourish the developing roots and shoots until the new plant becomes self-sustaining.

Effect of IBA and IAA on Root Initiation and Development of *Dracaena fragrans* Cutting

It has been repeatedly confirmed that auxin is required for initiation of adventitious roots on stems, and indeed, it has been shown that divisions of the first root initial cells are dependent upon either applied or endogenous auxin (Hartmann *et al.* 2006).

Herein work suggested that rooting percentage, number of roots/cutting, root thickness, root fresh and dry weights and speed of root appearance were enhanced by

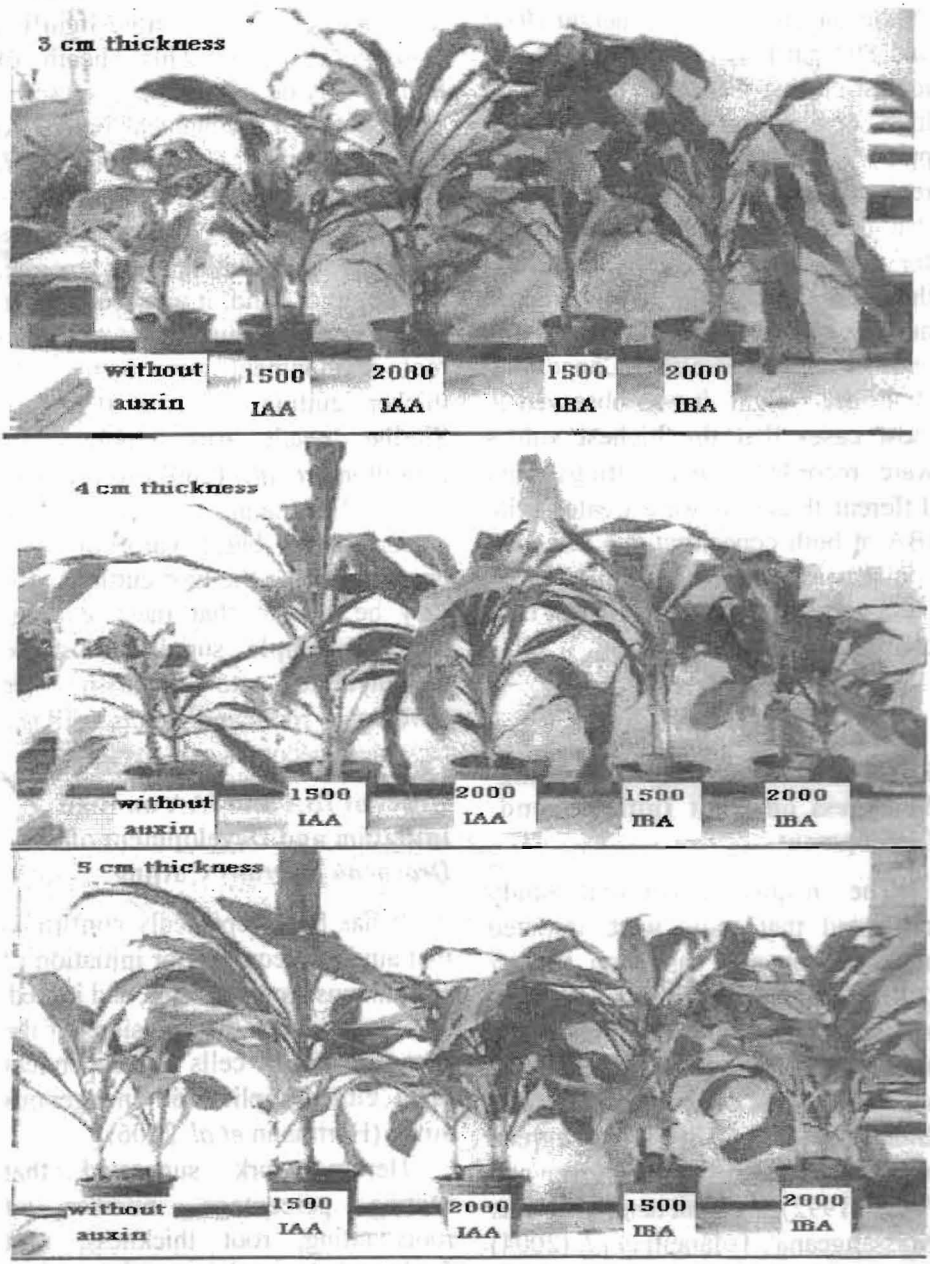

Fig. 3. Plantlets of *Dracaena fragrans* obtained from different cutting thickness (3.0, 4.0 or 5.0 ± 0.2 cm) treated with different auxin treatments (IAA or IBA at 0, 1500 or 2000 ppm) after 5.5 months from culture

treating cuttings with auxin (both IAA and IBA). This enhancing effect of auxin on root initiation and development was repeatedly demonstrated by many authors (Iqbal *et al.*, 1999 on apple plant; Hosni *et al.*, 2000 on bougainvillea plant; Khattak *et al.*, 2001 on some olive cultivars; Rahman *et al.*, 2002 on olive cultivar "Coratina" ; Ullah *et al.*, 2005 on guava plant). The results also demonstrated that IBA was more effective than IAA concerning root initiation and development. This result was also recorded by El-Sawy *et al.* (2000) on *Dracaena marginata* micropropagation. This may be due to the fact that IBA is more stable than IAA, since indoleacetic acid oxidase in plant tissue will break down IAA but has no apparent effect on IBA (Hartmann *et al.*, 2006).

Effect of *Dracaena fragrans* Cutting Thickness on Bud Sprouting and Shoot Growth

The advantages of using the highest cutting thickness for enhancing the number of sprouted buds/ cutting, number of leaves/ plant and shoot fresh and dry weights were reported in this study. In a similar approach Salehi and Khosh-Khui (1997) found that the best in vitro shoot development and proliferation of miniature roses were obtained by single node stem cutting with the greatest length and diameter. Also, Agbo and Obi (2007) reported that using of hardwood cutting to propagate *Gongronema latifolia* gave the highest number of leaf/cutting and number of shoots/cutting compared with soft and semi-hardwood cuttings. This may be due to nutritional factors, particularly carbohydrate availability in the explant or cutting (Salehi and Khosh-Khui, 1997 and Hartmann *et al.*, 2006).

Effect of Auxin Treatments on Bud Sprouting and Shoot Growth of *Dracaena fragrans*

The present study demonstrated that treating of cutting with auxin (IAA or IBA) resulted in increasing plant height and shoot fresh and dry weights/plant. This result was previously recorded by Iqbal *et al.* (1999) on apple, Khattak *et al.* (2001) on different olive cultivars, Husen and Pal (2003) on teak plant (*Tectona grandis*) and Khan *et al.* (2004) on rose. This might be attributed to the fact that auxin has a stimulatory effect on cell division, cell enlargement and stem growth and elongation (Davies, 2004). On the other side, herein work confirmed that auxin treatments had no significant effect on number of sprouted buds/cutting and number of leaves/plant. In this connection, Iqbal *et al.* (1999) on apple and Ullah *et al.* (2005) on guava plant reported that treating the cuttings with different concentrations of IBA (0 – 5000 ppm) had no significant effect on leaf number/plant.

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تأثير سمك العقلة و المعاملة بالاكسين على إكثار نبات الدراسينا فراجرانس

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أخذت عقل من نبات الدراسينا بأقطار مختلفة (٣ أو ٤ أو ٥ ± ٢. سم) و تم معاملتها باندول حمض الاستيك أو اندول حمض البيوتريك بتركيزات مختلفة (صفر ، ١٥٠٠ او ٢٠٠٠ جزء فى المليون). فوجد أن إستخدام العقل ذات أكبر سمك أو معاملات اندول حمض البيوتريك كان له تأثير إيجابي علي معظم الصفات التي تم تسجيلها و الخاصة بنمو الجذور و الافرخ ، بينما أدى إستخدام العقل ذات أقل سمك أو معاملات اندول حمض الاستيك لزيادة طول الجذور و إرتفاع النباتات الناتجة. علاوة علي ذلك ، فقد أمكن الحصول علي أكبر عدد من الجذور علي العقلة ، و أعلى وزن طازج و جاف للجذور عند معاملة العقل ذات أكبر سمك باندول حمض البيوتريك بتركيز ٢٠٠٠ جزء فى المليون ، بينما سجلت أعلى القيم بالنسبة لعدد البراعم المتفتحة على العقلة ، و عدد الاوراق على النبات ، و الوزن الطازج للافرخ عند معاملة هذه الفئة من العقل باندول حمض البيوتريك بتركيز ١٥٠٠ جزء فى المليون.