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EFFECT OF SOME POST-HARVEST TREATMENTS ON UNROOTED CUTTING OF *DRACAENA MARGINATA*

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ABSTRACT: This study was carried out at the Post-harvest Lab. of Ornamental Plants and Landscape Gardening Res. Dept., Hort. Res. Inst., Giza, Egypt during the two seasons of 2014/2015 and 2015/2016. The aim of this study is to investigate the effect of GA_3, BA, 8-HQC, CA and Sug. as the preservative solution to improve the quality of the unrooted cutting, delaying leaf wilting, leaf yellowing and extending the shelf life period of unrooted cutting of *Dracaena marginata*. The results revealed that, the treatment of the solution containing the GA_3 at 50 ppm + BA at 20 ppm + 8-HQC at 300 ppm + CA at 300 ppm + Sug. at 2%, followed by the solution containing GA_3 at 50 ppm + BA at 20 ppm + CA at 300 ppm + Sug. at 2% significantly increased the water uptake, water balance, general appearance, vase life, chlorophyll a, b, carotenoids and total carbohydrates. It also reduced the amount of water loss in all days compared to other treatments. It can be recommended that holding unrooted cutting of *Dracaena marginata* in a solution containing GA_3 at 50 ppm + BA at 20 ppm + 8-HQC at 300 ppm + CA at 300 ppm + Sug. at 2%, followed by the solution containing GA_3 at 50 ppm + BA at 20 ppm + CA at 300 ppm + Sug. at 2% to improve quality and giving longer vase life was reached 50 days.

Key words: *Dracaena marginata*, postharvest, unrooted cutting, vase-life.

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 separated into a family of their own, Dracaenaceae or in the Agavaceae. The demand for shoot-tops of *Dracaena marginata* is still increasing in Europe. It's known as the Madagascar dragon tree, evergreen, growing up to 200 cm, shiny leaves 30 to 40 cm long. The two-colored leaves set colorful contrasts in living rooms, gardens and on balconies. It conjures a tropical atmosphere in every living room and captivates with a rich leaf green. It needs bright conditions. A place with lots of sun but without direct sunlight is its favorite. It tolerates semi-shade to a shady places but it will grow slower (Anonymous, 2011 and Ladha, 2011).

Growth regulators and commercially available conditioners in holding solution are recommended to prolong the postharvest longevity (Rubinowska *et al.*, 2012), benzyl adenine (BA) and gibberellic acid (GA_3) are pulsing regulators that delay leaf yellowing and consequently increase leaf longevity and reduce leaf chlorosis and yellowing in several cut foliage and flower species by increasing photosynthesis pigments (Skutnik *et al.*, 2001 and Sardoei *et al.*, 2014).

Mutui *et al.* (2001) indicated that BA equivalent has the potential to be used as a commercial cut flower preservative solution

for delaying flower senescence, prolonging the vase life and enhancing postharvest quality of *Alstroemeria aurantiaca* L. cut flowers. Singh *et al.* (2008) demonstrated that the vase solution treatment combinations of gibberellic acid (GA_3) and benzyladenine (BA) with sucrose significantly increased the vase life of cut spikes of gladiolus as compared to the sucrose alone treatment or the control. Swider *et al.* (2015) on hybrid lily flowers, showed that gibberellic acid delayed leaf yellowing which was in turn hastened by the preservative except in leaves on decapitated shoots. Leaf senescence was the earliest in detached single leaves. Hassani and Alimirzaii (2017) stated that, the different concentrations of GA_3 and $CaCl_2$ increased the vase life of "Velvet" cut rose. The longest vase life (17.8 days) was observed in the combination of GA_3 at 1 mM with calcium chloride at 15 mM concentrations. The effect of GA_3 postharvest foliar application in increasing fresh weight of cut stem and improving of solution uptake of cut rose stem extended by increasing in calcium chloride concentration.

Adding chemical preservatives to the holding solution is recommended to prolong the vase life. All holding solutions must contain essentially two components sugar and germicides. The sugar provides a respiratory substrate (Pun and Ichimura, 2003), while the germicides control harmful microorganisms (bacteria, algae, yeasts and fungi) that block the stems xylem vessels and prevent water uptake. Different types of sugar, sucrose have been found to be the most commonly used sugar in prolonging vase life, Asil and Roein (2012) on *Alstroemeria* indicated that, the higher concentration of sucrose (60 mM) did not improve vase life, but significantly increased pigment content in the leaves. The longevity of leaves was improved by both sucrose (3, 7 day) and trehalose (4, 7 day). Whereas, 8-Hydroxyqunoline (8-HQ) is the most powerful germicide (Faragher *et al.*, 2002, Hettiarachchi and Balas, 2005). Skutnik *et al.* (2006) recorded that 8-HQC and sucrose solution doubled vase life in *Asparagus densiflorus* "Meyerii". Elhindi (2012) showed that, all treatments had improved the keeping quality and vase life of the cut flowers comparing to the control ones. Among all these treatments, the 8-HQS combined with 2% sucrose showed the best water uptake, water balance, percentage of maximum increase in fresh weight of the cut flower stems and vase life which was extended up to 17 days of *Lathyrus odoratus* L. El-Ebrashi (2014) concluded that the treatment of Suc. + SA + 8-HQC as a holding solution in *Asparagus densiflorus* and *Nephrolepis exaltata* followed by Suc. + Methanol at 4% increased the longevity, water uptake, percentage of both fresh weight and total carbohydrates, in addition to improving the general appearance. Moreover, these treatments decreased the carotenoids content and the degradation of chlorophyll a and b as compared to the control.

Citric acid enhances vas life by reducing the risk of vascular blockage in cut flower through its anti-embolism trait because it reduced pH of the solution and reduced microorganisms growth (Bhattacharjee *et al.*, 1993).

El-Quesni *et al.* (2012) showed that using solution of citric acid (100 or 200 ppm) or aluminum sulfate at 200 ppm combined with sucrose 4% significantly increased both water uptake and water loss during all shelf life periods (3^{rd}, 6^{th}, 9^{th} and 12^{th}), as compared to other treatments. Whereas, using aluminum sulfate + citric acid (100 or 200 ppm) with sucrose significantly lowered weight loss of *Schefflera* foliage and increased dry weight percentage, vase life (days), chlorophyll a, b and total soluble sugars. Sakr *et al.* (2014) results indicated that it is recommended to hold the cut flowering stem of *Limonium sinuatum* cv. "Velvet Wings" in a solution containing 2% sucrose + 200 mg/l 8-hydroxquinoline citrate + 150 mg/l citric acid + 150 mg/l 6-benzyladenine + 0.5 ml/l Tween 20 under room temperature ($21\pm1^{o}C$) for prolonging their longevity and improving

quality of flowers, comparing with the other treatments. Heider (2015) on *Fatsia japonica* and *Rumohra adiantiformis* found that the water loss increased during the vase life of *F. japonica* and *R. adiantiformis* at the end of the study. Sucrose at 20 g/l + BA at 10 mg/l + citric acid at 200 mg/l + Clorox at 2 ml/l) was the significantly effective treatment giving the less water loss compared to Ca EDTA 1 g/l + sucrose 20 g/l. It increased the percentage of total carbohydrates compared to holding in distilled water (control) under room temperature in both seasons.

The aim of this study is to investigate the effect of GA_3, BA, 8-HQC, CA and Sug. as the preservative solution to improve the quality of the unrooted cutting, delaying leaf wilting and leaf yellowing and extending the shelf life period of unrooted cutting of *Dracaena marginata*.

MATERIALS AND METHODS

This study was carried out at the Post-harvest Lab. of Ornamental Plants and Landscape Gardening Res. Dept., Hort. Res. Inst., Giza, Egypt, during the two seasons of 2014/2015 and 2015/2016. The aim of this study is to investigate the effect of gibberellic acid (GA_3), 6-benzyladenine (BA), 8-hydroxyqunoline citrate (8-HQC), citric acid (CA) and sugar (Sug.) as the preservative solution to improve the quality of the unrooted cutting, delaying leaf wilting, leaf yellowing and extending the shelf life period of unrooted cutting of *Dracaena marginata*.

Plant material:

The stem length of unrooted terminal cutting of *Dracaena marginata* was 22 cm and the number of leaves were 15-20/unrooted cutting. It was harvested in 1st December at fully mature, healthy, undamaged and uniform unrooted cutting from local commercial ornamental farm.

Holding solution treatments:

T1: Sterilized distilled water (DW) which was used as a control.

T2: GA_3 at 50 ppm.

T3: BA at 20 ppm.

T4: 8-HQC at 300 ppm.

T5: CA at 300 ppm.

T6: Sug. at 2%.

T7: GA_3 at 50 ppm + Sug. at 2%.

T8: BA at 20ppm + Sug. at 2%.

T9: GA_3 at 50 ppm + 8-HQC at 300 ppm + Sug. at 2%.

T10: BA at 20 ppm + 8-HQC at 300 ppm + Sug. at 2%.

T11: GA_3 at 50 ppm + CA at 300 ppm + Sug. at 2%.

T12: BA at 20 ppm + CA at 300 ppm + Sug. at 2%.

T13: GA_3 at 50 ppm + BA at 20 ppm + CA at 300 ppm + Sug. at 2%.

T14: GA_3 at 50 ppm + BA at 20 ppm + 8-HQC at 300 ppm + CA at 300 ppm + Sug. at 2%.

Unrooted cuttings of *Dracaena* were placed in glass bottles containing 500 ml/unrooted cutting of previous mentioned chemical preservative solutions as well as distilled water as control treatment and kept in the Lab. at room temperature at 16±2 ^{o}C and 50-60% relative humidity and continuous lighting with fluorescent lamps 1000 Lux for 24 h.

Data recorded:

The data were recorded at the end of the shelf life periods:

1. Water relations: (a) water uptake (g/ unrooted cutting), (b) water loos (g/ unrooted cutting), (c) water balance (g/ unrooted cutting), were recorded at 8, 22 and 36 days during the shelf life periods.
2. General appearance, the quality of cut foliage was evaluated based a scale

ranging, 1= bad (25%) [greenish yellow], 2= moderate (25% to >50%) [yellowish green], 3= good (50% to >75%) [slightly yellowish] and 4= excellent (75% to 100%) [completely healthy leaves no wilting] as described by Sangwangkul *et al*. (2008) were recorded at 22 and 36 days during the shelf life periods.

3. The changing of fresh weight (%) was recorded at 8, 22 and 36 days during the shelf life periods.
4. Vase life (days) was recorded at the end of shelf life period.
5. Dry weight of unrooted cutting (g).

Chemical composition:

1. Pigments contents (mg/g F.W.) in leaves after two weeks of starting experiment (chlorophyll a, b and carotenoids) according by Moran and Porath (1980).
2. Total carbohydrates content (%) in dry leaves at the end of shelf life periods, according to the methods described by Herbert *et al*. (2005).

Layout and statistical analysis:

The layout of the experiment was a complete randomized design with one factor, with 14 treatments, each treatment contained 3 replicates and each replicate contained 3 unrooted terminals cutting in *Dracaena* (Snedecor and Cochran, 1989). The obtained data were statistically analyzed using Duncan's Multiple Range Test at 5% (Duncan, 1955).

RESULTS AND DISCUSSION

Water relations (g/day):

The data concerning the effect of different solutions on water relation are presented in Tables (1 and 2) showed that the highest water uptake during the shelf life period up to 36 days of dracaena unrooted cutting was obtained by placing these in a holding solution containing T14: 50 ppm GA_3 + 20 ppm BA + 300 ppm 8-HQC + 300 ppm CA + 2% Sug. and the treatment of T13: 50 ppm GA_3 + 20 ppm BA + 300 ppm CA + 2% Sug. as this holding solution increased water balance compared to the other treatments in all days. The same treatments was significantly decreased water loss. On the other hand, T6: sugar at 2% gave the lowest water uptake and water balance and increased the water loss in the two seasons. Similar results were reported by Gendy and Mahmoud (2012) on bird of paradise cut flower, Reddy *et al.* (1995) on tuberose and EL-Saka (1992) on tuberose and bird of paradise cut flower

The change in fresh weight (%):

The results in Table (3) recorded that T14: GA_3 at 50 ppm + BA at 20 ppm + 8-HQC at 300 ppm + CA at 300 ppm + Sug. at 2% and T13: GA_3 at 50 ppm + BA at 20 ppm + CA at 300 ppm + Sug. at 2% significantly decreased the change of fresh weight of the unrooted cutting of *D. marginta* in all days. Whereas, the treatments T1: control and T6: Sug. at 2% increased it and the end shelf life before 36th day. In this respect, Abou El-Ghait *et al.* (2012) on chrysanthemum (*Dendranthema grandiflorum* Kitam.) cv. "White Zambla" found that, all holding solution treatments increased change percentage in fresh weight of cut flower spike with superiority for the treatment of sucrose at 2% + 8-hydroxyquinoline sulphate at 100 ppm + citric acid at 100 ppm.

Vase life (day) and dry weight (g/unrooted cutting):

The results in Table (4) showed that holding *Dracaena* in T9: GA_3 at 50 ppm + 8-HQC at 300 ppm + Sug. at 2%, T10: BA at 20 ppm + 8-HQC at 300 ppm + Sug. at 2%, T12: BA at 20 ppm + CA at 300 ppm + Sug. at 2%, T13: GA_3 at 50 ppm + BA at 20 ppm + CA at 300 ppm + Sug. at 2% and T14: GA_3 at 50 ppm + BA at 20 ppm + 8-HQC at 300 ppm + CA at 300 ppm + Sug. at 2% significantly increased the vase-life compared to other treatments. On the other hand, the treatment T1: control and T6: Sug. at 2% gave the lowest vase-life in the two seasons.

Table 1. Effect of some chemicals holding solutions on water uptake, water loss and water balance during the shelf life periods (days) of *Dracaena marginata* unrooted cutting in the first season.

Treatments	First season								
	Water uptake (g/unrooted cutting)			Water loss (g/unrooted cutting)			Water balance (g/unrooted cutting)		
	8 days	22 days	36 days	8 days	22 days	36 days	8 days	22 days	36 days
Distilled water (control)	107.1 g	197.1 j	——	121.3 b	257.5 b	——	-14.25 j	-60.35 l	——
GA_3	117.7 e	219.1 f	391.2 f	109.9 h	227.4 f	430.7 d	7.84 ef	-8.22 g	-39.52 g
BA	117.3 e	218.3 f	384.8 g	114.2 g	227.9 f	451.0 c	3.14 e-g	-9.63 g	-66.22 h
8-HQC	117.3 e	216.5 g	383.1 g	115.6 f	241.8 e	453.1 c	1.79 fg	-25.27 h	-69.95 h
CA	110.5 fg	201.43 i	355.8 i	120.1 c	250.7 c	533.5 a	-9.63 ij	-49.23 k	-177.53 j
Sug.	90.7 h	179.3 k	——	135.6 a	306.3 a	——	-44.88 k	-127.00 m	——
GA_3 + Sug.	113.7 ef	202.9 i	370.6 h	119.0 d	247.8 d	470.1 b	-5.25 hi	-44.92 j	-99.43 i
BA + Sug.	114.2 ef	209.4 h	370.9 h	116.9 e	246.8 d	466.9 b	-2.72 gh	-37.33 i	-96.02 i
GA_3 + 8-HQC + Sug.	125.9 c	240.5 cd	425.1 c	107.1 j	211.9 i	398.0 g	18.82 cd	28.57 d	27.09 c
BA + 8-HQC + Sug.	127.9 bc	241.7 c	426.4 c	105.1 j	209.9 j	394.9 gh	22.63 c	31.86 c	31.52 c
GA_3 + CA + Sug.	118.4 de	222.0 e	399.0 e	109.8 h	226.1 g	423.1 e	8.59 e	-4.18 f	-24.15 f
BA + CA + Sug.	124.2 cd	239.9 d	404.7 d	108.5 i	222.6 h	413.0 f	15.66 d	17.32 e	-8.36 e
GA_3 + BA + CA + Sug.	132.9 b	243.9 b	444.9 b	100.3 l	203.7 k	393.1 h	32.55 b	40.23 b	51.74 b
GA_3 + BA + 8-HQC + CA + Sug.	140.4 a	253.6 a	460.3 a	85.7 m	189.3 l	392.9 h	54.63 a	64.30 a	67.37 a

Values have the same letter are not significantly different at 5% level using Duncan's Test.

GA_3=gibberellic acid at 50 ppm, BA= 6-benzyl adenine at 20 ppm, 8-HQC= 8-Hydroxyquinoline citrate at 300 ppm, CA= citric acid at 300 ppm, Sug.= sugar at 2%.

Table 2. Effect of some chemicals holding solutions on water uptake, water loss and water balance during the shelf life periods (days) of *Dracaena marginata* unrooted cutting in the second season.

Treatments	Second season								
	Water uptake (g/unrooted cutting)			Water loss (g/unrooted cutting)			Water balance (g/unrooted cutting)		
	8 days	22 days	36 days	8 days	22 days	36 days	8 days	22 days	36 days
Distilled water (control)	114.4 i	210.5 j	351.3 k	126.3 b	251.7 b	496.4 a	-11.88 l	-41.18 m	-145.18 l
GA_3	119.7 f	230.9 e	405.0 f	114.0 g	233.6 g	423.7 f	5.73 g	-2.77 g	-18.74 f
BA	119.3 fg	228.1 f	396.8 g	115.3 f	241.1 f	427.5 e	3.95 h	-13.07 h	-30.68 g
8-HQC	119.1 fg	219.7 g	393.9 h	115.7 f	243.2 e	433.9 d	3.34 h	-23.48 i	-39.95 h
CA	114.5 i	214.6 i	363.9 j	124.5 c	251.5 b	472.8 b	-10.04 k	-36.92 l	-108.89 k
Sug.	92.6 j	188.0 k	——	130.0 a	275.9 a	——	-37.40 m	-87.90 n	——
GA_3 + Sug.	116.3 h	216.9 h	382.1 i	120.0 d	246.8 c	460.7 c	-3.71 j	-29.93 k	-78.61 j
BA + Sug.	118.4 g	217.3 h	392.2 h	118.4 e	245.8 d	434.7 d	0.00 i	-28.48 j	-42.53 i
GA_3 + 8-HQC + Sug.	130.5 d	236.9 b	418.8 d	107.0 j	225.4 i	414.5 h	23.51 d	11.52 d	4.28 d
BA + 8-HQC + Sug.	136.5 c	256.2 a	455.3 c	104.7 k	223.5 j	385.6 j	31.87 c	32.72 c	69.73 c
GA_3 + CA + Sug.	121.3 e	232.3 d	404.6 f	111.2 h	231.7 h	420.9 g	10.06 f	0.52 f	-16.33 e
BA + CA + Sug.	121.3 e	235.3 c	411.0 e	109.0 i	231.1 h	406.7 i	12.35 e	4.15 e	4.33 d
GA_3 + BA + CA + Sug.	137.9 b	256.4 a	461.9 b	104.2 k	220.5 k	379.3 k	33.73 b	35.97 b	82.58 b
GA_3 + BA + 8-HQC + CA + Sug.	140.0 a	256.6 a	485.5 a	88.5 l	205.4 l	361.9 l	51.54 a	51.16 a	123.65 a

Values have the same letter are not significantly different at 5% level using Duncan's Test.

GA_3= gibberellic acid at 50 ppm, BA= 6-benzyl adenine at 20 ppm, 8-HQC= 8-Hydroxyquinoline citrate at 300 ppm, CA= citric acid at 300 ppm, Sug.= sugar at 2%.

Table 3. Effect of some chemicals holding solutions on the changing of unrooted cutting fresh weight during the shelf life periods (days) of *Dracaena marginata* unrooted cutting in the two seasons.

Treatments	The changing of unrooted cutting fresh weight (g)					
	First season			Second season		
	8 days	22 days	36 days	8 days	22 days	36 days
Distilled water (control)	4.51 b	44.99 b	—	7.26 b	33.54 b	—
GA_3	0.49 f	8.23 h	52.62 e	1.09 g	3.35 h	50.18 f
BA	1.46 e	11.16 g	56.77 d	2.23 f	6.10 g	51.70 e
8-HQC	2.84 d	11.90 f	72.46 c	2.41 e	7.33 f	56.86 d
CA	4.32 c	30.81 c	31.80 l	7.22bc	14.75 c	96.23 a
Sug.	6.30 a	48.01 a	—	9.59 a	38.16 a	—
GA_3 + Sug.	2.89 d	25.87 d	79.43 a	7.15 c	10.42 d	76.20 b
BA + Sug.	2.86 d	20.98 e	74.17 b	2.62 d	9.04 e	57.79 c
GA_3 + 8-HQC + Sug.	-0.42 i	5.02 k	23.35 h	-0.95 i	-2.99 k	11.05 i
BA + 8-HQC + Sug.	-1.17 j	-0.29 l	17.32 i	-1.89 j	-3.12 l	7.72 j
GA_3 + CA + Sug.	0.32 g	7.28 i	36.61 f	0.88 h	1.63 i	41.76 g
BA + CA + Sug.	0.18 h	5.33 j	30.00 g	0.87 h	-1.67 j	21.00 h
GA_3 + BA + CA + Sug.	-1.35 k	-1.12 m	14.80 j	-4.73 k	-4.54 m	4.33 k
GA_3 + BA + 8-HQC + CA + Sug.	-4.18 l	-3.67 n	7.34 k	-5.05 l	-12.06 n	-2.78 l

Values have the same letter are not significantly different at 5% level using Duncan's Test.

GA_3=gibberellic acid at 50 ppm, BA= 6-benzyl adenine at 20 ppm, 8-HQC= 8-Hydroxyquinoline citrate at 300 ppm, CA= citric acid at 300 ppm, Sug.= sugar at 2%.

Table 4. Effect of some chemicals holding solutions on vase life, dry weight and general appearance during the shelf life periods (days) of *Dracaena marginata* unrooted cutting in the two seasons.

Treatments	Vase life (day)		Dry weight (g)		General appearance			
					22 days	36 days	22 days	36 days
	First season	Second season	First season	Second season	First season		Second season	
Distilled water (control)	26.0 g	28.0 h	15.38 l	21.55 l	3	—	3	—
GA_3	47.0 b	47.0 b	20.33 f	24.19 f	4	3	4	4
BA	43.0 c	47.0 b	19.80 g	23.45 g	4	3	4	3
8-HQC	43.0 c	42.3 e	19.47 h	23.38 h	3	3	4	2
CA	30.3 f	30.3 g	16.73 k	21.69 k	3	2	3	2
Sug.	25.0 h	27.0 i	15.26 m	20.37 m	3	—	3	—
GA_3 + Sug.	34.0 e	40.0 f	17.22 j	21.99 j	3	2	3	3
BA + Sug.	36.0 d	43.0 d	17.75 i	23.09 i	3	2	3	3
GA_3 + 8-HQC + Sug.	50.0 a	50.0 a	22.55 d	24.80 d	4	4	4	4
BA + 8-HQC + Sug.	50.0 a	50.0 a	22.78 c	26.09 c	4	4	4	4
GA_3 + CA + Sug.	47.0 b	45.0 c	20.40 f	24.68 e	4	3	4	4
BA + CA + Sug.	50.0 a	50.0 a	20.67 e	24.77 d	4	3	4	4
GA_3 + BA + CA + Sug.	50.0 a	50.0 a	23.88 b	27.98 b	4	4	4	4
GA_3 + BA + 8-HQC + CA + Sug.	50.0 a	50.0 a	27.41 a	28.28 a	4	4	4	4

Values have the same letter are not significantly different at 5% level using Duncan's Test.

GA_3=gibberellic acid at 50 ppm, BA= 6-benzyl adenine at 20 ppm, 8-HQC= 8-Hydroxyquinoline citrate at 300 ppm, CA= citric acid at 300 ppm, Sug.= sugar at 2%.

4= excellent (75-100%), 3= good (50-75%), 2= moderate (25-50%), 1= bad (>25%).

Data in Table (4), revealed that, using T14: GA_3 at 50 ppm + BA at 20 ppm + 8-HQC at 300 ppm + CA at 300 ppm + Sug. at 2%, gave the heaviest dry weight (27.41 and 28.28 g in the first and second seasons, respectively) compared to the other treatments, followed by T13: GA_3 at 50 ppm + BA at 20 ppm + CA at 300 ppm + Sug. at 2%. However, T6: Sug. at 2% gave the lowest dry weight (15.26 and 20.37 g) of *Dracaena* in the two seasons, respectively. Those of results agreed with Pinto *et al.* (2007) on *Ctenanthe setosa* and Singh *et al.* (2008) on gladiolus.

General appearance:

Data presented in Table (4) demonstrated that, in the two seasons, the most of treatments were excellent except for the treatments of T1: control, T4: 8-HQC, T5: CA and T6: Sug. alone or with GA_3 or BA gave good quality in 22^{th} day, while in 36^{th} day, the quality was the best with the treatments of T14: GA_3 at 50 ppm + BA at 20 ppm + 8-HQC at 300 ppm + CA at 300 ppm + Sug. at 2% and T13: GA_3 at 50 ppm + BA at 20 ppm + CA at 300 ppm + Sug. at 2%. The treatment of T6: Sug. at 2% gave the lowest the general appearance. A similar trend was obtained on *Fatsia japonica* and *Rumohra adiantiformis* by Heider (2015) showed that, the combination of 20 g/l sucrose + 10 mg/l BA + 200 mg/l CA + 2 ml/l Clorox helped in enhancing the general appearance compared with the control in the first and second seasons.

Chemical composition:

Data presented in Table (5) mentioned that, the unrooted cutting of *Dracaena* holding in solution consists of T2: GA_3 at 50 ppm or T3: BA at 20 ppm increased the concentration of chlorophyll a, b and carotenoids in leaves, whereas, total carbohydrates % in the leaves was enhanced with T14: GA_3 at 50 ppm + BA at 20 ppm + 8-HQC at 300 ppm + CA at 300 ppm + Sug. at 2%. On the other hand, T6: Sug. at 2% decreased content of chlorophyll a, b, carotenoids and total carbohydrates %. In this concern (Skutnik *et al*., 2001 and Sardoei, 2014) recorded that benzyl-adenine (BA) and gibberellic acid (GA_3) are delays leaf yellowing and consequently increase leaf longevity and reduce leaf chlorosis and yellowing in several cut foliage and flower species by increasing of synthesis of photosynthesis pigments**.**

Recommendation: It can be recommended that holding unrooted cutting of *Dracaena marginata* in solution containing GA_3 at 50 ppm + BA at 20 ppm + 8-HQC at 300 ppm + CA at 300 ppm + Sug. at 2%, followed by solution GA_3 at 50 ppm + BA at 20 ppm + CA at 300 ppm + Sug. at 2% to improve quality and longer vase life was reached 50 days.

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Table 5. Effect of some chemicals holding solutions on chlorophyll a, b, carotenoid and total carbohydras of *Dracaena marginata* unrooted cutting in the two seasons.

Treatments	First season				Second season			
	Chlor. a (mg/g F.W.)	Chlo. b (mg/g F.W.)	Carotenoid (mg/g F.W.)	Carbo. (%)	Chlor. a (mg/g F.W.)	Chlo. b (mg/g F.W.)	Carotenoid (mg/g F.W.)	Carbo. (%)
Distilled water (control)	0.47 j	0.11 g	0.18 g	1.79 l	0.22 i	0.06 e	0.11 h	4.68 l
GA_3	0.95 b	0.32 b	0.53ab	8.00 f	1.15 ab	0.44 a	0.61 a	8.84 f
BA	1.17 a	0.41 a	0.62 a	7.52 g	1.21 a	0.44 a	0.63 a	7.90 g
8-HQC	0.69gh	0.23 de	0.39 d-f	7.11 h	0.71 de	0.22 d	0.46 de	7.22 h
CA	0.78 de	0.25 c-e	0.46 b-d	2.11 k	0.67 ef	0.21 d	0.46 de	5.13 k
Sug.	0.34 k	0.07 g	0.12 g	0.77 m	0.20 i	0.06 e	0.10 h	2.60 m
GA_3 + Sug.	0.81 d	0.29 b-e	0.47 b-d	5.57 j	0.67 e-g	0.20 d	0.44 e	6.03 j
BA + Sug.	0.58 i	0.14 fg	0.31 f	6.33 i	0.34 h	0.07 e	0.14 h	6.94 i
GA_3 + 8-HQC + Sug.	0.75 ef	0.24 c-e	0.45 b-d	11.17 c	0.58 g	0.18 d	0.33 g	11.88 c
BA + 8-HQC + Sug.	0.73fg	0.24 c-e	0.40 c-e	11.44 b	0.60 fg	0.19 d	0.38 f	12.14 b
GA_3 + CA + Sug.	0.64 h	0.22ef	0.34 ef	8.84 e	0.78 d	0.29 c	0.48 de	9.80 e
BA + CA + Sug.	0.68 gh	0.22 e	0.38 d-f	9.39 d	0.99 c	0.29 c	0.51 cd	11.23 d
GA_3 + BA + CA + Sug.	0.87 c	0.30 b-d	0.49bc	11.48 b	0.99 c	0.32 c	0.54 bc	12.17 b
GA_3 + BA + 8-HQC + CA + Sug.	0.87 c	0.31 bc	0.50 b	12.73 a	1.11 b	0.38 b	0.60ab	12.95 a

Values have the same letter are not significantly different at 5% level using Duncan's Test.

GA_3=gibberellic acid at 50 ppm, BA= 6-benzyl adenine at 20 ppm, 8-HQC= 8-Hydroxyquinoline citrate at 300 ppm, CA= citric acid at 300 ppm, Sug.= sugar at 2%.

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تأثير بعض معاملات مابعد الحصاد على العقل الغير مجذرة للدراسينا مارجيناتا

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أجريت هذه الدراسة في معمل بحوث تداول الزينة -قسم بحوث نباتات الزينة وتنسيق الحدائق- معهد بحوث البساتين - مركز البحوث الزراعية- الجيزة - مصر خلال الموسمين ٢٠١٥/٢٠١٤ و ٢٠١٥ /٢٠١٦. الهدف هو دراسة تأثير محاليل الحفظ المحتوية على حمض الجبريلليك والبنزايل أدنين و٨-هيدروكسي كينولين سترات وحمض السيتريك والسكرومقارنتها بالماء المقطرعلى تحسين جودة العقل الطرفية الغير مجدرة وتأخير إصفرار الأوراق وذبولها وزيادة عمر أوراق العقل الطرفية الغير مجذرة لنبات الدراسينا مارجيناتا. وأظهرت النتائج الآتى: أدت المعاملة المكونة من حمض جبريلليك بتركيز ٥٠ جزء في المليون + بنزايل أدنين بتركيز ٢٠ جزء في المليون + ٨-هيدروكسى كينولين سيترات بتركيز ٣٠٠ جزء في المليون + حمض سيتريك بتركيز ٣٠٠ جزء في المليون + سكروز ٢% ثم يليه المعاملة المكونة من حمض جبريلليك بتركيز ٥٠ جزء في المليون + بنزايل أدنين بتركيز ٢٠ جزء في المليون + حمض سيتريك بتركيز ٣٠٠ جزء في المليون + سكروز ٢% إلى زيادة معنوية في إمتصاص الماء والإتزان المائى بالإضافة إلى تحسين جودة العقل الطرفية الغير مجذرة وزيادة فترة عمرها وزيادة تركيز الكلوروفيل أ، ب والكاروتينويدات والكاربوهيدرات الكلية، كما أدت إلى خفض كمية الماء المفقود، في جميع الأيام مقارنة بالمعاملات الأخرى.

التوصية: يوصى بوضع العقل الطرفية الغير مجذرة للدراسينا مارجيناتا في محلول مكون من حمض جبريلليك بتركيز ٥٠ جزء في المليون + بنزايل أدنين بتركيز ٢٠ جزء في المليون + ٨-هيدروكسى كينولين سترات بتركيز ٣٠٠ جزء في المليون + حمض سيتريك بتركيز ٣٠٠ جزء في المليون + سكروز ٢% يليه المحلول المكون من حمض جبريلليك بتركيز ٥٠ جزء في المليون + بنزايل أدنين بتركيز ٢٠ جزء في المليون + حمض سيتريك بتركيز ٣٠٠ جزء في المليون + سكروز ٢% لتحسين جودة العقل وزيادة عمرها.