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EFFECT OF AUXINS AND ASCORBIC ACID ON PROPGATION OF *Bougainvillea glabra* THROUGH STEM CUTTINGS

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ABSTRACT

This study was carried out in private Farm at Al- kanatier Al-khairyia region during tow successive seasons (2008/2009- 2009/2010) to evaluate response of stem cuttings of *Bougainvillea glabra* plant to rooting by auxins and ascorbic acid . The results clearly showed that, IBA 5000 ppm + ascorbic acid 50 ppm recorded the highest values in rooting percentage /plant (77 and 80 %) in the first and the second season respectively .Concerning number of roots / plant, the highest significant values were recorded in both seasons with IBA 4000 ppm individually , IBA 4000 ppm + ascorbic acid 50ppm and IBA 6000 ppm + ascorbic acid 100 ppm .Measuring of root length cm/plant ,the highest significant values were recorded with high levels of IBA and NAA individually or combined with different levels of ascorbic acid .Regarding shoot length cm /plant ,the highest significant values were recorded with high levels of IBA and NAA individually or combined with ascorbic acid in 1st season , while in 2nd season the highest significant values were recorded with high levels of IBA and NAA individually .

INTRODUCTION

Vegetative propagation of ornamental plants through stem cutting is one of the cheapest and sometimes, the only method available for multiplication. However, under normal conditions, wide variability is noticed in different cultivar of the same species. While some cultivars root easily, others are either difficult or fail to root by the application of growth regulators alone ; and Bougainvillea is no exception. Several workers in the best have tried various chemicals and /or growth regulators for induction of rooting in stem cuttings of Bougainvillea, Phillipp and Gopalakrishnan (1981). Cutting propagation is commonly used in the commercial production of ornamental foliage crops. Cuttings of some species root readily without an auxin treatment, while cuttings of other species benefit from auxin treatment through enhanced promotion of rooting; benefits may be dependent upon the species and cultivar, condition of the cutting wood, time of year, and other factors, Griffith (1998). *Bougainvillea glabra* growth habit and beautiful showy bracts make it a popular plant for landscape. It is used in mass plantings, as shrubs or bushes, and as ground cover on banks. Bougainvillea provides hedges, barriers, and slope coverings. For large, difficult-to-maintain areas, Bougainvillea is an excellent ground cover. It can cover a whole hillside and will choke out weed growth . Dwarf cultivars make colorful ground covers, Bougainvillea should not be planted within 4 feet of walkways, as the thorns could catch unsuspecting passersby. Softwood terminals, maturing green wood, and matured intermediate wood stem pieces can be used for propagation, Kobayash *et al.*(2007) . Synthetic hormones like IBA and NAA are commonly used to promote root development in asexual propagation. IBA is widely used as a root-initiation promoter in agriculture, Waisel *et al.* (1991). Root-promoting chemicals for cutting propagation commonly contain Indole-3-butyric acid (IBA), Naphthaleneacetic acid (NAA), or a combination of the two, and are available in liquid, talc, tablet, and gel formulations. Liquid formulations are generally sold as solvent- based concentrates that may be diluted to the desired concentration for treating cuttings of specific crops, Blythe *et al.* (2004) Commercial root-promoting chemicals are normally applied to the basal portion of cuttings using a liquid or talc formulation of auxin. The quick-dip method is often preferred by commercial propagators for application of liquid auxin formulations for reasons of economy, speed, ease, and uniformity of application and results. An extended basal soak may be utilized for some difficult-to-root species, Hartmann *et al.* (2002). Plant damage occurs when the capacity of antioxidant processes and detoxification mechanisms are lower than the amount of reactive oxygen species production. Aerobic organisms have developed complex systems protecting them from reactive oxygen species, , consisting of several enzymes and antioxidants. Those mechanisms can slow down or even stop the oxidation of biomolecules and block the process of oxidative chain reactions, Sgherri *et al.* (2003). The most important are low-molecular antioxidants such as ascorbic acid, glutathione, thiols, α- tocopherol and protective pigments such as carotenoids, Tausz *et al.* (2003) . Application of ascorbic acid in combination with an auxin (IBA) promotes rooting in terms of number of roots/cutting in various plant species, Bose *et al*. (1982) . Makes rooting earlier and improves the quality of roots compared to those treated with an auxin alone, Sharma and Rai (1993).

MATERIALS AND METHODS

This investigation was carried out in private Farm at Al- kanatier Al-khairyia region during tow successive seasons (2008/2009 - 2009/2010) to evaluate response of stem cuttings of *Bougainvillea glabra* plant to rooting by auxins and ascorbic acid .

Plant Materials.

The cuttings of *B. glabra* plant used in this study were collected from mother plants which are growing in Al- kanatier Al-khairyia region during mid of February month . Cuttings immersed for 15 sec. at different concentrations of IBA , NAA and ascorbic acid as follow :

1- IBA (0.0 [control] , 4000,5000,6000 or 7000 ppm).
2- NAA (4000, 5000, 6000 or 7000 ppm).
3- IBA (0.0 [control] , 4000,5000,6000 or 7000 ppm) combined with ascorbic acid (50 or 100 ppm.)
4-NAA (4000,5000 ,6000 or 7000 ppm) combined with ascorbic acid (50 or 100 ppm.)
5-Ascorbic acid (50 or 100 ppm., individually).

The cuttings were planted in plastic pots (8 cm) diameter full of silt soil under plastic tunnel.

Measurements and Determinations :

The following parameters were recorded after 60 days from sowing at each growing season as follow: rooting percentage/plant, root number/ plant, root length cm / plant and Shoot length cm/ plant.

The statistical analysis.

The statistical analysis: All experiments were conducted under complete randomized design (CRD) with three replications and 9 plants for each replicate (Snedecor and Cochran, 1972) and the means were compared using L.S.D. test.

RESULTS AND DISCUSSION

Rooting percentage /plant

Data in Table (1) and Fig. (1) showed that. Ascorbic acid (50 and 100 ppm) combined with different levels of IBA caused increasing in rooting percentage / plant comparing with other treatments.

Table (1) Effect of auxins (IBA and NAA , individually) and (ascorbic acid) on vegetative propagation of *Bougainvillea glabra* through stem cuttings.

Auxins ppm		Ascorbic acid ppm	1st season 2008/2009				2nd season 2009/2010			
			Root number /plant	Rooting %	Root length cm/plant	Shoot length /cm	Root number /plant	Rooting %	Root length cm/plant	Shoot length / cm
Cont.	**0.0**	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IBA	**4000**	**0.0**	10.0	40	7.3	8	9.8	45	7	10.3
	5000	**0.0**	8.1	55	8.1	8.6	8.3	50	7.6	12.6
	6000	**0.0**	7.6	44	8.6	11.3	7.5	44	8.3	14
	7000	**0.0**	7.3	30	13	13	6.6	33	10.6	15.3
NAA	**4000**	**0.0**	4.6	22	6.6	10.5	5.3	30	6.3	11.5
	5000	**0.0**	6.3	33	7.6	8.2	6.0	35	7.3	7.6
	6000	**0.0**	5.5	44	8.6	11.3	5.1	45	8	10.6
	7000	**0.0**	4.5	44	9.3	11.3	4.6	50	9.6	10.25
IBA	**0.0**	**50**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	4000	**50**	10.3	40	5.1	8	9.6	45	5	9
	5000	**50**	8.3	77	9.3	9.6	8.6	80	9.6	11
	6000	**50**	7.3	44	9.5	11.3	7.6	50	10.3	11.6
	7000	**50**	7	25	12.6	10.5	7.3	30	11.5	10
	0.0	**100**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
	4000	**100**	6	44	7	13	6.5	40	7.5	12
	5000	**100**	7.3	44	7.3	11.7	7	45	7.1	11.3
	6000	**100**	9.6	70	8	8	10.3	72	7.6	7.7
	7000	**100**	6.3	50	9.3	8.3	6.6	45	8.5	8.6
NAA	**4000**	**50**	4.6	25	6.6	8.6	5.6	30	6.3	9.3
	5000	**50**	6.5	40	7.5	10	7.0	35	7.6	11.1
	6000	**50**	5	50	8.6	11.5	5.3	55	8.3	11
	7000	**50**	3.6	35	9.3	11	3.0	30	9	10
	4000	**100**	6.3	25	7	10	6.3	25	7.6	11.3
	5000	**100**	5.3	40	8.6	7.6	5.6	45	9.6	7.6
	6000	**100**	4.3	50	9.3	7.3	4.6	53	10.6	7
	7000	**100**	3.5	30	12.3	6.5	3.3	35	12.6	6.3
L.S.D 5%			1.12	-	1.07	1.75	1.4	-	1.2	1.3

On the other hand, control treatments (IBA and NAA , 0.0 ppm) and ascorbic acid (50 and 100 ppm, individually) recorded (0.0 rooting percentage/plant). 5000 ppm IBA caused slight increasing in rooting percentage/plant comparing with 7000 ppm NAA it were (55 and 50 % , respectively). The highest value of rooting percentage recorded with 5000 ppm IBA combined with 50 ppm ascorbic acid (77 and 80 %, respectively) in 1st and 2nd season . On the other hand, increasing levels of IBA from 4000 to 5000 ppm caused increasing in root percentage , while the increasing from 6000 to 7000 caused a reduction in rooting percentage. In case of NAA , increasing different levels from 4000 to 7000 ppm caused increasing in rooting percentage /plant . In this respect, Torrey (1976) Observed that, Auxins are involved in the process of adventitious root formation. In many woody plants, IBA is commonly used to promote root initiation. Several authors have shown that auxin is only required during the initiation phase, and becomes inhibitory for root outgrowth, Klerk *et al.* (1990). An inhibitory effect of auxin is also observed when explants are exposed to a too high concentration of IBA. This inhibition of rooting is often accompanied with callus formation. The presence of callus on the stem discs increased time for rooting as well as the number of roots formed , Welander (1983). Using ascorbic acid (100 mg/l) inhibited markedly the browning of explants and increased plant length and number of leaves , Badawy (2005) . Ascorbic acid was considerably superior in terms of rooting percentage and the number of roots produced per shoot , Công-Linh Lê. (2001).

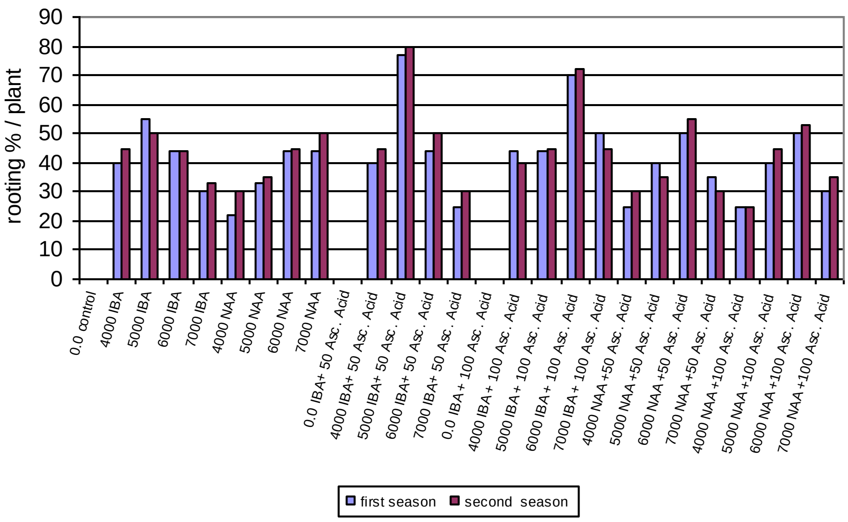

Fig. (1): Effect of (IBA, NAA and Ascorbic acid ppm) on rooting %/ plant.

Root number / plant

Data in Table (1) and Fig. (2) show that, IBA 4000 ppm , IBA 4000 ppm + ascorbic acid 50 ppm and IBA 6000 ppm + ascorbic acid 100 ppm were recorded the highest significant values of root number /plant (10.0 , 10.3

and 9.6, respectively) in 1st season and (9.80, 9.60 and 10.30 ,respectively) in 2nd season . Increasing levels of IBA from 4000 to 7000 ppm individually or combined with ascorbic acid 50 ppm caused decreasing in root number / plant, while increasing levels of IBA from 4000 to 6000 combined with 100 ppm ascorbic acid caused increasing in root number /plant then decreased with IBA 7000 ppm + ascorbic acid 100 ppm . Cuttings not treated with either IBA and NAA failed absolutely to induce roots ,even ascorbic acid at (50 and 100 ppm) was added. Different levels of IBA were recorded the best results comparing with NAA.

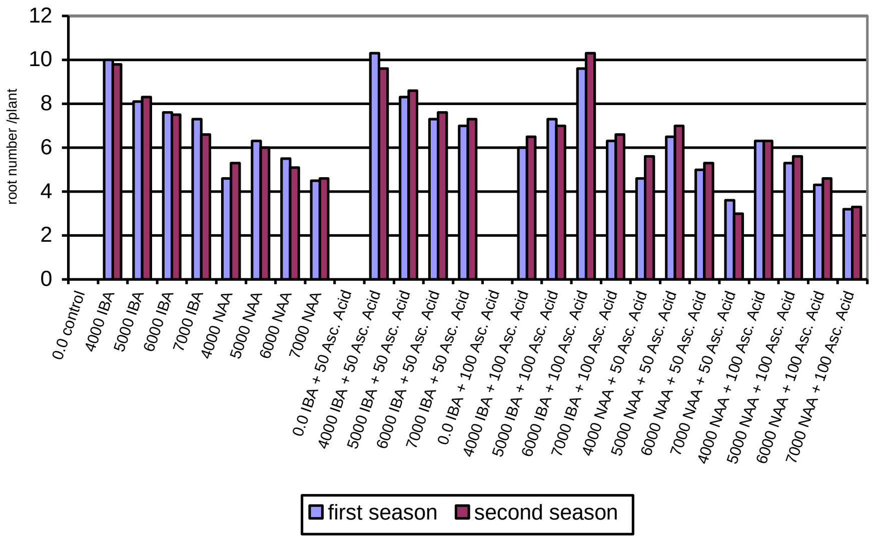

Fig. (2): Effect of (IBA, NAA and Ascorbic acid ppm) on root number/ plant.

Root length cm/plant

In this respect data in Table (1) and Fig. (3) show that, increasing different levels of IBA and NAA from 4000 to 7000 ppm individually or combined with ascorbic acid (50 and 100 ppm) caused increasing in root length cm / plant . Control treatments of (IBA and NAA, 0.0 ppm) and ascorbic acid (50 and 100 ppm , individually) recorded the lowest significant value of root length(0.0 cm). On the other hand , the highest significant values of root length cm / plant was recorded with IBA 7000 ppm (13 cm) in 1st season. while IBA 7000 ppm + ascorbic acid 50 ppm (12.6 and 11.5 cm) in 1st and 2nd seasons, respectively . Moreover NAA 7000 ppm + ascorbic acid 100 ppm (12.3 and 12.6 cm) in 1st season and in 2nd season .

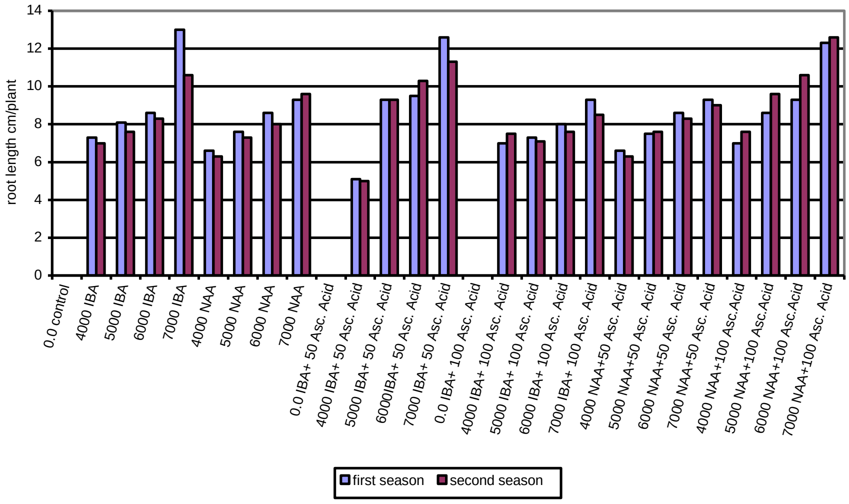

Fig. (3): Effect of (IBA , NAA and Ascorbic acid ppm) on root length cm/ plant.

Shoot length cm / plant.

Data in Table (1) and Fig. (4) show that, increasing different levels of IBA from 4000 to 7000 ppm individually caused increasing in shoot length cm / plant, while in case of NAA 5000 ppm recorded the lowest value comparing with other different levels. On the other hand ,increasing IBA from 4000 to 6000 ppm combined with ascorbic acid 50 ppm caused increasing in shoot length cm / plant then decreased with 7000 ppm .In IBA case combined with ascorbic acid 100 ppm ,increasing IBA levels from 4000 to 6000 ppm recorded decreasing in shoot length cm / plant and increasing with IBA 7000 ppm ., increasing different levels of NAA from 4000 to 6000 ppm combined with ascorbic acid 50 ppm recorded increasing in shoot length cm / plant but decreased with 7000 ppm . While increasing level of NAA from 4000 to 7000 ppm combined with ascorbic acid 100 ppm recorded decreasing in shoot length cm / plant . Actually, control treatments (IBA and NAA , 0.0 ppm) and ascorbic acid (50 and 100 ppm) individually recorded (0.0 cm in shoot length cm / plant since cuttings didn't produce any root . It is worth that, the highest significant values of shoot length cm / plant were recorded with (IBA, 6000 and 7000 ppm, individually),(NAA, 6000 and 7000 ppm individually) , (IBA 6000 ppm + ascorbic acid 50 ppm, IBA 4000 ppm + ascorbic acid 100 ppm and IBA 5000 ppm + ascorbic acid 100 ppm) and (IBA 6000 ppm + ascorbic acid 50 ppm) in 1st season , while in 2nd season the highest value recorded with (IBA, 6000 and 7000 ppm, individually). Previous data clearly show that, ascorbic acid combined with IBA were more effective to recording the highest value in rooting percentage comparing with IBA and NAA individually, while control treatments (IBA or NAA ,0.0 ppm individually or combined with ascorbic acid 50 or 100 ppm recorded rooting percentage 0.0 %). Our results have confirmed that, treating woody cuttings with auxin plays a vital role in stimulating adventitious root formation . Root initials in cutting, apparently, is dependent upon the native auxins in the plant, plus an auxin synergist together; these lead to synthesis of ribonucleic acid which is involved in initiation of the root primordial, Hartmann *et al*. (1990). The main cause in difficult to root cultivars may be the low endogenous auxin levels or the presence of inhibitors on auxin action. Ascorbic acid may be helping in some way to remove this problem , Chaudhary and Basu (1979). IBA is more effective than NAA in the rooting of *J.curcas,* these studies suggest that both IAA- oxidase and peroxidase helping auxin catabolism and in triggering the root initiation process. IAA-oxidase may be playing a part only for triggering and initiating the roots / root primordia; peroxidase may be involved in both root initiation and the elongation processes , Sunita *et al*. (2008) .

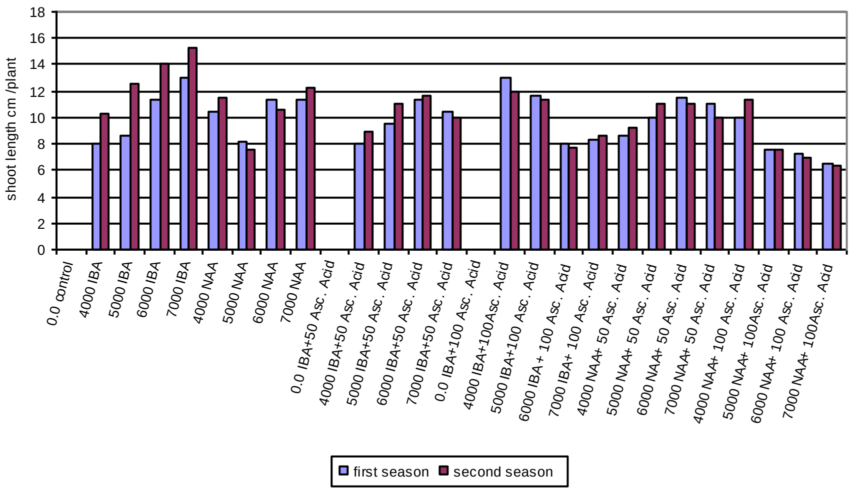

Fig. (4): Effect of (IBA , NAA and Ascorbic acid ppm) on shoot length cm / plant.

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تـأثير منظمـات النمـو و حـامض الاسـكوربيك علـى الاكثـار بالعقلـة السـاقية لنبـات الجهنمية

حسين عبد الحق بصيلة ، محمد الفاتح محمد زويل ، محمد عبد الفتاح معوض حمزة و محمد محمد امين
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اجريت هذه الدراسة خلال موسمى ٢٠٠٨ / ٢٠٠٩- ٢٠٠٩ /٢٠١٠ بمنطقة القناطر الخيرية لدراسة تأثير استخدام منظمات النمو و حامض الاسكوربيك على الاكثار الخضرى بالعقل الساقية لنبات الجهنمية . تشير اهم النتائج التي تم التوصل اليها إلي أن استخدام حامض اندول بيوترك بتركيز ٥٠٠٠ جزء في المليون + حامض الاسكوربيك بتركيز ٥٠ جزء في المليون اعطى اعلى نسبة تجذيرللعقل المعاملة حيث كانت فى الموسم الاول ٧٧ % و الموسم الثانى ٨٠ %, بينما فى عدد الجذور للنبات اوضحت النتائج ان استخدام حامض اندول بيوترك منفردا بتركيز٤٠٠٠ جزء فى المليون او بنفس التركيز + حامض اسكوربيك ٥٠ جزء فى المليون و حامض اندول بيوترك بتركيز ٦٠٠٠ جزء فى المليون + حامض اسكوربيك بتركيز ١٠٠ جزء فى المليون فى كلا الموسمين سجلا اعلى القيم , و فى طول الجذور (سم) سجلت اعلى القيم المعنوية باستخدام كلا من حامض اندول بيوترك و نفثالين حامض الخليك منفردين بتركيزات مرتفعة او متداخلين مع حامض الاسكوربيك , وفى طول الأفرع سجل استخدام كلا من حامض اندول بيوترك و نفثالين حامض الخليك بتركيزات مرتفعة منفردين او متداخلين مع حامض الاسكوربيك اعلي القيم المعنوية فى الموسم الاول بينما فى الموسم الثانى التركيزات المرتفعة من كلا من حامض اندول بيوترك و نفثالين حامض الخليك منفردين سجلا اعلى قيم معنوية لطول الافرع بالموسم الثاني.

قام بتحكيم البحث

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