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Effect of Media and Different Concentrations of IBA on Rooting of '*Ficus benjamina* L.' Cutting

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Abstract

Ficus benjamina is a very popular and resistant indoor plant in temperate areas. Cutting is the easiest propagation method of this plant and it requires special treatments such as auxin and appropriate rooting medium. In order to test the suitable auxin (IBA) concentration and rooting media, a factorial experiment carried out based on randomized complete block design with three replications. Experimental two factors were different concentrations of IBA (0, 2000, 4000 and 6000 ppm) and rooting media (sand, perlite and sand + perlite mixture). Rooting percentage, root number and longest root length was evaluated. Based on the results both rooting percent and longest root length were gained under 4000 ppm IBA. Rooting percent was maximized in combined treatment of "4000 ppm IBA + perlite" and "6000 ppm IBA + sand". The high number of roots was gained in "6000 ppm IBA+ sand".

Keywords: *Ficus benjamina* L., IBA, Media, Rooting.

INTRODUCTION

Ficus benjamina, commonly known as the weeping fig, is a member of Moraceae family. This plant is propagated through vegetative method, cutting (Motaghy, 2007). Cutting is an easiest and cheapest technique to mass propagation and production plants more uniform and genetically similar to the parent (Khoshkhoy, 1991). Moallemi & Chehrazy (2003) reported that auxin increases the number of rooted cuttings and reduces the cuttings mortality rate in the nursery. Barzegar *et al*., (2004) reported that selecting a suitable rooting media is an important step in horticultural and ornamental plants propagation. Sand is a cheaper and suitable medium for hard-wood cuttings. Loach (1988) stated that auxins can affect the physiological events of plant growth and differentiation such as rooting. However, auxins are applied to influence and facilitate the formation of roots on cuttings. The aim of our study was to investigate the effect of IBA on adventitious root formation of *Ficus benjamina* cuttings.

MATERIALS AND METHODS

This study carried out in a greenhouse located suburb of Rasht city as a factorial experiment based on randomized complete block design with two factors in three replications. The first factor included different concentrations of IBA (0, 2000, 4000 and 6000 ppm) and the second factor was the rooting media at three levels (sand, perlite and sand + perlite (1:1).

The cuttings were selected as uniform groups as possible. The mother bush was a strong, rich plant carefully selected for propagation. The cuttings obtained using 20 cm long young shoot that held 4-5 leaves each. Intermittent mist system was used. IBA was applied as a 10-second basal quick dip. Data analysis conducted via statistical software MSTATC and mean comparison was done using LSD test.

RESULTS AND DISCUSSION

The data analysis of variance (Table 1) showed that different concentration of auxin (IBA) and interaction of IBA and rooting media have had significant effect on rooting percent. Data mean comparison (Table 2) showed that the simple treatment of IBA 4000 ppm and interaction of 4000 ppm IBA + perlite and 6000 ppm IBA + sand medium have highest percentage of rooting. Based on ANOVA (Table 1) different levels of the IBA and interaction between IBA and rooting media influenced root number significantly ($p \leq 0.01$ and $p \leq 0.05$ respectively).

Data mean table (Table 2) revealed that IBA 4000 and 6000 ppm were the best simple treatments on number of roots per cutting. The combination of 6000 ppm IBA with sand medium caused the best effect. Fathi and Ismailpor (2000) believe that auxin increases the number of rooted cuttings and reduce the mortality rate of cuttings in the nursery (moalemy and Chehrazy, 2003). According Fukaki *et al*., (2007) auxin is a key plant hormone that promotes lateral root formation, but the moleucular mechanisms of auxinmediated lateral root formation remain unknown. Auxin also stimulates the formation of adventitious roots in many species through facilitating of carbohydrates transferring to the cutting base and root primordia motivating (Hartmann *et al*., 1990).

Based on analysis of variance (Table 1) different levels of IBA was significant on the length of longest root of cuttings. While rooting medium and the interaction of experimental factors did not affect the trait significantly. Table 2 shows that the longest root length belongs to the IBA 4000 ppm with the length 2.98 cm. Root initial primordia division correlated to endogenous or exogenous auxin (Khoshkhoy, 1991; Fathi and Ismailpor, 2000). it is seem that increased rooting in auxin treated cuttings is due to increased hydrolysis of carbohydrates or other reserves (Hartmann *et al*., 1990).

According Kwack *et al*., (1989) 200 mg l^{-1} of NAA and IBA applying for 30 minutes cause to increase rooting of stem cutting in *Ficus benjamina* and *Ficus nitida*. It is believed that superior concentration of IBA to 2000 ppm can improve the number of roots in cuttings of *Bougainvilliea*

spectabillish (Moalemy and Chehrazy, 2003). Barzegar *et al*., (2004) obtained the highest percentage of rooted cuttings of *Ginkgo biloba* under 4000 ppm IBA in the sand medium. Hashemabadi and Sedaghathoor (2005) stated that 4000 ppm IBA was the most effective concentration for increased rooting and longest root length of *Camellia japonica* cutting in 1:1 mixture of perlite and sand media. According to our results, choice of experimental rooting media (perlite or sand) can be done based on easy access and low cost of media. Sand is preferred to perlite; because sand medium is heavier the perlite and the cuttings may be moved in perlite (Barzegar *et al*., 2004).

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Tables

Table1. Analysis of variance of treatments effect on the traits

Source of variables	df	percent rooting	MS number root	longest root
Replication	2	58.33	20.63	1.48
Factor A (IBA)	3	**7977.78	144.80**	10.43*
Factor B (Rooting media)	2	900.00 ns	18.67 ns	1.57 ns
AB (IBA × media)	6	811.11*	32.71*	1.98 ns
Error	22	276.52	11.96	1.41
CV (%)	-	31.18	40.75	59.14

ns: Nonsignificant differences - * & **:significant difference at 1% and 5%

Table2. Data mean comparison of treatments on the traits

Treatment	Rooting percent (%)	Root number	Longest root length (cm)
a_1= without hormone (control)	11.11 b	2.83 b	0.96 b
a_2= 2000 ppm IBA	54.44 a	8.44 ab	2.89 ab
a_3= 4000 ppm IBA	77.78 a	11.11 a	2.98 a
a_4= 6000 ppm IBA	70.00 a	11.56 a	1.20 b
a_1b_1= no hormone + sand	10.00 e	1.83 e	_
a_1b_2= no hormone + perlite	13.33 e	2 e	_
a_1b_3= no hormone + sand and perlite	10.00 e	4.67 de	_
a_2b_1= 2000 ppm IBA + sand	30.00 de	4.83 de	_
a_2b_2= 2000 ppm IBA + perlite	83.33 a	13.50 ab	_
a_2b_3= 2000 ppm IBA+ sand and perlite	50.00 cd	7 cde	_
a_3b_1= 4000 ppm IBA + sand	66.67 abc	9.67 abcd	_
a_3b_2= 4000 ppm IBA + perlite	86.67 a	12.83 abc	_
a_3b_3= 4000 ppm IBA+ sand and perlit	80.00 ab	10.83 abc	_
a_4b_1= 6000 ppm IBA + sand	86.67 a	15.33 a	_
a_4b_2= 6000 ppm IBA + perlite	70.00 abc	11.33 abc	_
a_4b_3= 6000 ppm IBA+ sand and perlite	53.33 bcd	8 bcd	_