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INFLUENSE OF INDOLE BUTYRIC ACID (IBA) FOR STENTING PROPAGATION OF CUT ROSE

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ABSTRACT

Growth promoting hormones like auxins are now a day commercially used for rooting of many ornamental plants including roses in propagation industries of many countries. Their effects are however influenced by environmental conditions, types of plants, the rooting media and the concentrations used. This research was therefore mainly conducted to evaluate the effects of different IBA concentrations on growth and development of stenting-propagated roses. The experiment was laid down in completely randomized design with four replications in the propagation house of Tana Flora PLC. The performance of rose cuttings treated with 1500 ppm of IBA was the best in all growth parameters including shoot length, Root length, toot number etc. which can be recommended to propagate roses by stenting method in the study area.

Contribution/Originality: This study is one of very few studies which have been investigated for the improvement of the rooting capacity, growth and development of stenting-propagation of cut rose flowers treating with IBA-Hormone. Therefore, the present finding will contribute to flower growers and propagators through providing ideal concentration of IBA Hormone.

1. INTRODUCTION

Roses are conventionally propagated by cutting, budding, grafting and layering methods. Grafting and cutting are indeed the common propagation methods used in commercial rose production [1]. Growth promoting hormones like auxins are nowadys used commercially in the propagation industry for rooting of many ornamental plants including roses since they influence the growth and development of plant cells [2]. Among the auxins, Indole Butyric acid (IBA) and Naphtalin Acetic acid (NAA) are typically used for rooting of cuttings of the majority of plant species including roses. Their effect however depends on the concentration applied and the age of cuttings [3, 4]. The concentrations of these auxins recommended by the manufacturers are quite general and not specific to roses and it may also differ with environmental conditions [5, 6]. Hence, investigating the optimal concentration of IBA under specific environmental conditions for specific crop is necessary.

2. MATERIALS AND METHODS

2.1. Description of the Study Area

The study was conducted in the propagation house from December 2013 to January 2014 in Bahir Dar, Southwestern Ethiopia. The propagation house was equipped with necessary facility where the average temperature and relative humidity were 35^{O}C and 85%, respectively.

2.2. Experimental Materials and Propagation Procedure

In this study, hardwood cuttings of rose varieties of Natal Break and Acpinc were used as rootstock and scion, respectively, which are commonly used in Ethiopia. Both the rootstock and the scion were taken from healthy branches of the respective mother plants as described. Coco peat which was produced from waste products of coconut palm (*Cocos nucifera*) and imported from Israel was used as propagation medium. The prepared scions were grafted on rootstock cuttings using with simple whip grafting (splice grafting) method as described by Younis [7]. The bottom ends of the grafted cuttings were then wounded using clean and sharp knife by making vertical cuts to facilitate root induction.

2.3. Experimental Treatments and Design

Six concentrations of IBA such as 0, 1000, 1500, 2000, 2500, and 3000ppm were prepared by weighing the respective quantity of IBA and by dissolving it in water. Application of IBA was done by dipping the basal portion of the grafted stem cuttings in the solutions of respective hormone concentrations for five seconds whereas the control cuttings were dipped in water without IBA. After drying of the treated portion, grafted rose cuttings were planted in plastic pots (90x250mmsize of the pots) filled with coco peat as rooting medium. Treatments (pots) were laid down in completely randomized design (CRD) with four replications on propagation bench.

2.4. Data Collection and Analysis

Root number: roots emerged from four randomly selected seedlings were counted and the average values were taken for further analysis.

Root length (cm): The length of the longest root was measured from the point of emergency to the tip using scaled meter and the average length taken from four randomly selected sample seedlings ..

Root fresh weight (g/plant): The fresh weights of emerged roots of four randomly selected sample seedlings were measured using electrical sensitive balance

Root dry weight (g/plant): The roots of four randomly selected sample seedlings were dried in oven for 24 hours at 60^{0}C and weighed using electrical sensitive balance.

Length of the shoots (cm): The newly grown shoots of four randomly selected sample seedlings were measured from the point of emergency to the tip using linear meter.

Shoot fresh weight (g/plant): The fresh weights of newly grown shoots of four randomly selected sample seedlings were measured by using electrical sensitive balance.

Shoot dry weight (g/plant): The dry weights of newly grown shoots of four randomly selected sample seedlings were dried in oven for 24 hours at 60^{0}C and weighed using electrical sensitive balance.

Leaf number: The newly grown leaves from four randomly selected sample seedlings were counted and the average leaf numbers were taken.

The collected data were subjected to analysis of variance (ANOVA) using SAS version 9.0 and mean comariosion was made using LSD at 1% or 5% probability depending the ANVOA results.

3. RESULTS AND DISCUSSION

The analysis of variance reveled that all above ground growth parameters of grafted rose cuttings were affected by IBA concentrations used in this study (Table 1 & Figure 1). Both the fresh and dry weights of as well as the height and leaf number of rose cuttings were highly significantly influenced by the IBA concentrations compared to the untreated control. The highest aboveground growth parameters including shoot fresh (2.35 g) and dry weights (0.81 g), shoot length (18.12 cm) and leaf number (65.75) were however obtained from rose cuttings treated with 1500ppm of IBA. The performance of untreated rose cuttings in all aboveground growth parameters was least compared to IBA treated cuttings (Table 1). Rose cuttings treated with 1500ppm of IBA were about 108.0% longer and recorded about 209.2%, 440.0% and 78.3% more shoot fresh, and dry weights and leaf number respectively, compared to the untreated control (Figure 1).

Table-1. Aboveground growth parameters of propagated rose cuttings as influenced by IBA concentrations

IBA concentration	Aboveground growth parameters			
	SFW (g/plant)	SDW (g/plant)	SL (cm)	LN (No/plant)
0ppm	0.76c	0.15c	8.71e	36.87d
1000ppm	1.55b	0.50b	11.00d	55.5b
1500ppm	2.35a	0.81a	18.12a	65.75a
2000ppm	1.87ab	0.49b	14.12b	57.31b
2500ppm	1.46b	0.48b	12.25c	54.25b
3000ppm	1.38b	0.36b	10.56d	46.56c
CV (%)	23.67	24.05	5.56	5.05
SE±	0.30	0.045	0.32	1.25
P-value	<0.0004	<0.0001	<0.0001	<0.0001

SFW = Shoot fresh weight; SDW = shoot dry weight; SL = Shoot length; LN = Leaf number; CV = coefficient of variance; SE = Standard deviation; P = probability; Means with the same letter/s in columen are similar

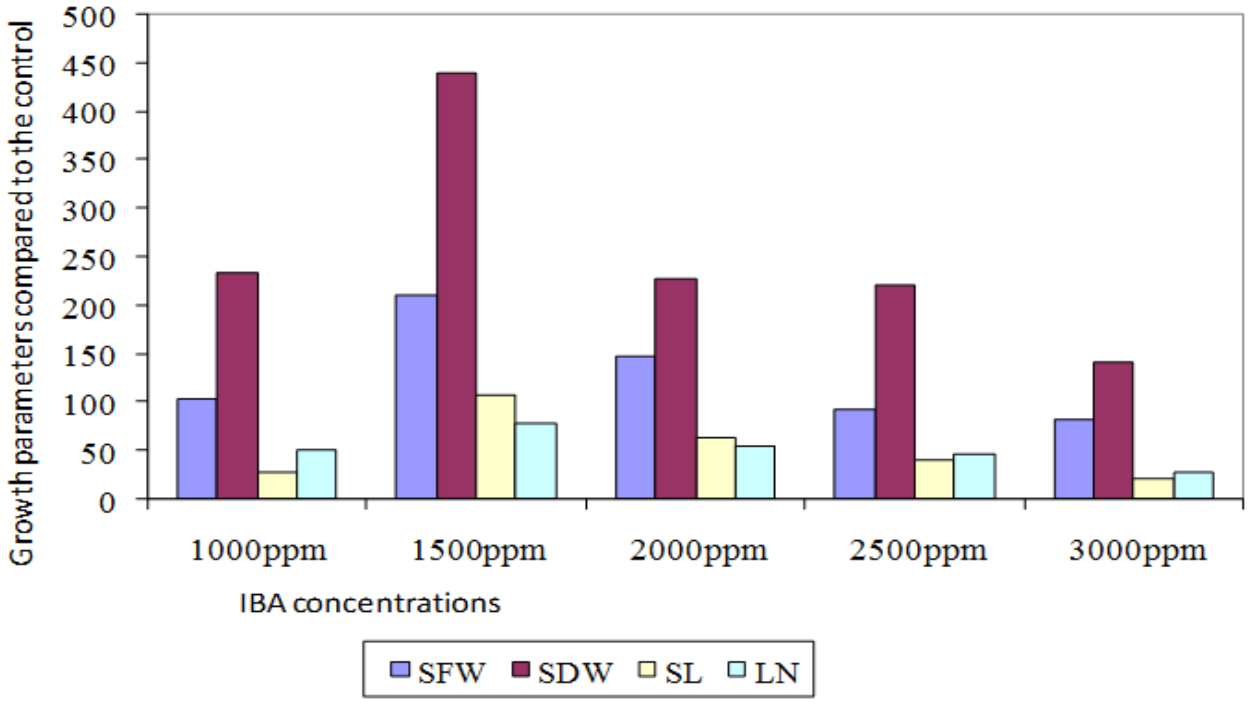

Figure-1. Percentage increment in above ground growth parameters of stenting-propagated rose cuttings due to IBA application, SFW = Shoot fresh weight; SDW = shoot dry weight; SL = Shoot length; LN = Leaf number
Source: collected during the experiment

Similarly, the underground parts of the rose cuttings were also highly significantly influenced by the IBA concentrations used in this study (Table 2). The highest root fresh (0.85 g), and dry (0.29 g weights, number (64.56) and length (13.5 cm) of the roots of the cuttings were observed on propagated rose cuttings which were supplied

with 1500ppm IBA concentration. Fresh, and dry weights and number, and lenth of roots RFW, RDW, RN and RL of rose cuttings which were treated with 1500 ppm IBA were higher by about 254.2%, 1350%, 109.6% and 131.2%, respectively, compared to the untreated rose cuttings as indicated in Figure 2.

Table-2. Underground growth parameters of propagated rose cuttings as influenced by IBA concentrations

IBA concentration	Underground growth parameters			
	RFW (g/plant)	RDW (g/plant)	RN (No/plant)	RL (cm)
0ppm	0.24c	0.02c	30.80b	5.84b
1000ppm	0.32bc	0.11b	57.56a	8.62b
1500ppm	0.85a	0.29a	64.56a	13.50a
2000ppm	0.39bc	0.14b	54.43a	8.50b
2500ppm	0.37bc	0.12b	34.06b	6.62bc
3000ppm	0.41b	0.14b	41.50b	7.25bc
CV (%)	22.43	27.59	18.31	16.38
SE±	0.04	0.04	3.54	0.63
P-value	<0.0001	<0.0001	<0.0001	<0.0001

RFW = Root fresh weight; RDW = root dry weight; RN = root number; RL = root length; CV = coefficient of variance; SE = Standard deviation; P = probability; Means with the same letter/s in column are similar

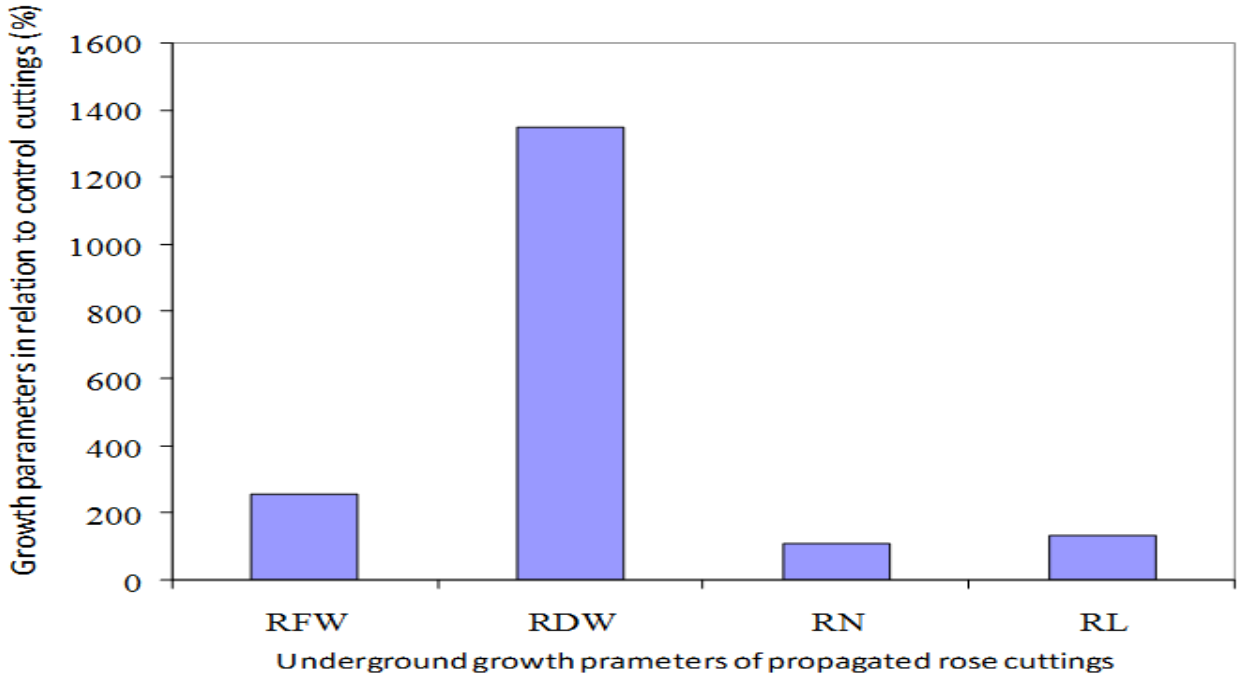

Figure-2. Increment in underground growth parameters of stenting-propagated rose cuttings due to application of 1500ppm IBA in comparison with control, RFW = Root fresh weight; RDW = root dry weight; RN = root number; RL = root length
Source: collected during the experiment

Growth promoting hormones affect the growth and development of plants. These effects can be used in the progagation industry of various crop plants including roses. Their performance is however influenced among others by the types of hormones used and their concentrations as well as the species of plantsas decribed by various researchers [2, 4, 8].

Among the growth regulators, auxins, especially that of indolyle Butric Acid (IBA) is the most common hormone used in the propagation industry of floricultural crops like roses. As indicated in this study the concentrations ranging from 1000 to 3000 ppm had positive effects on stenting propagated roses. However, the best shoot, and root growth performance of cuttings were obtained when rose cuttings were treated with 1500 ppm of IBA. Untreated rose cuttings generally have shown the poor rooting and shoot growth performance in the present study. These results are in aggrement with the findings of Susaj, et al. [9] and Younis [7] where IBA at

the concentration of 1500pp resulted the best growth performance of rose cuttings. Similarly, poinsettia treated with 1500ppm IBA resulted the best growth performance [10] poinsettia.

4. CONCLUSION

Application of IBA hormone on hard wood stem cuttings significantly affected the rooting capacity and shoot characters of stenting-propagated rose. Based on the results of the present study, pre-treating of rose hard wood cutting with 1500ppm IBA can be recommended for the improvement of the rooting capacity, growth and development of stenting-propagated roses in the study area. Further researchs on the effects of IBA on roses and other floricultural crops using different growth media at different seasons are also recommended.

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