Original Research Article

Effect of IBA on growth of V-1 mulberry cuttings with varying number of buds

ABSTRACT

The present study on effect of different concentrations of IBA (0, 1000, 2000 and 3000 ppm) on V-1 mulberry cuttings with varying number of buds (one, two, three and four) consist of sixteen treatments which were replicated thrice in Factorial CRD. The results on interaction effect of various concentration of IBA on mulberry cuttings with varying number of buds recorded best results in three budded cuttings treated with 3000 ppm of IBA regarding number of sprouted cuttings (14.67) and survival percentage (96.66 %) of the saplings. Number of leaves (10.60) and length of shoot (26.63 cm) was maximum in two budded cuttings treated with 3000 ppm of IBA and the results of this interaction were on par with three budded cuttings treated with 3000 ppm of IBA. Whereas, one budded cuttings without IBA treatment recorded minimum number of sprouted cuttings (9.67), survival percentage (43.33 %), number of leaves (5.67) and length of shoot (21.43 cm).

Keywords: IBA, buds, cuttings, mulberry.

1. Introduction

Sericulture is an ancient and important rural agro-based industry par excellence with agriculture base and industrial super structure, which aims at uplifting the socio-economic standards of people who are engaged in sericulture. The major activities in sericulture include establishment of mulberry garden, production of cocoon, production of raw silk and production of fabric [1]. Among these mulberry nursery management has gained the position of a commercial venture with its short gestation period and low investment. Mulberry propagation in nurseries has proven well to establish healthy mulberry garden. Direct planting of mulberry cuttings in main field leads to poor establishment rate and hence they are raised under nursery condition. Mulberry saplings are to be raised for about four to six months in nursery to establish mulberry bush garden and for a period of eight months to make a tree plantation.

Propagation of mulberry from semi hard wood cuttings has distinct advantages over the direct plantation of cuttings, majorly higher survival rate due to already developed root system. Saplings enable quick establishment and vigorous growth. Endogenous and exogenous factors such as genotype, timing, cutting types, rooting environment, and the age of the parent material from which cuttings are obtained affecting rooting and survival rate of the saplings [2]. So application of exogenous plant growth promoting substances recommended for promoting adventitious roots in stem-cutting propagation for overcoming these problems is an alternative. Treatment of auxins to cuttings causes physiological changes during the adventitious root formation which helps in mobilization of carbohydrates from leaves and upper stem, and accelerates their transport to the rooting zone. Auxin induces hydrolysis and mobilization of nutritional factors to the site of application, thereby promoting root initiation in stem cuttings. Auxin results in the breakdown of starch into soluble sugars bulk of which was used in rooting process [3]. Among auxin compounds, Indole-3-butyric acid (IBA) is the

most widely used root promoting chemical in the nursery trade, because it is non toxic over a wide range of concentrations. IBA have higher stability and slow rate of conjugation, this will induce more rooting and will be available over a longer period of time for cuttings [4].

2. Material and methods

The present investigation was carried out in Department of Sericulture, GKVK, University of Agricultural Sciences, Bangalore. The experiment consists of 2 factors, number of eye buds (one, two, three and four) and concentration of IBA (0, 1000, 2000 and 3000 ppm) which makes total treatment sixteen. They were replicated thrice in factorial completely randomized design. The basal ends of the mulberry cuttings were dipped in dilute solutions of 0, 1000, 2000 and 3000 ppm of Indole-3-Butyric Acid by quick dip method for 10 seconds before planting of cuttings in polythene bag. After the treatment, the cuttings were immediately planted in rooting media which consisting of soil, sand and farm yard manure (FYM) in ratio of 1:1:1 by v/v.

Table 1: Effect of IBA concentration on growth parameters of V-1 mulberry cuttings with varying number of buds

Ⅰ No. of Buds	Number of sprouted cuttings at 15th DAP	Survival percentage of saplings at 30th DAP	Number of leaves per sapling at 90th DAP	Length of shoot at 90th DAP (cm)
1 bud	10.1	51.25	6.01	22.56
2 buds	12.0	75	8.73	24.80
3 buds	13	88.75	8.92	25.18
4 buds	11.3	79.58	8.15	24.53
CD at 1%	0.87	3.94	1.00	0.69
Ⅱ Concentration of IBA				
0 ppm	10.6	61.25	6.86	23.26
1000 ppm	11.4	70.83	7.79	24.15
2000 ppm	11.9	79.58	8.96	24.69
3000 ppm	12.5	82.91	8.2	24.98
CD at 1%	0.87	3.94	1.00	0.69

DAP- days after planting

3. Results and discussion

The data presented in Table 1 indicates the effect of IBA on growth parameters of mulberry saplings with varying number of buds. The result recorded significant difference among number of buds. The maximum number of sprouted cuttings (13 at 15th DAP), survival percentage (88.75 % at 30th DAP),

Table 2: Interaction effect of IBA concentration on growth parameters of V-1 mulberry cuttings with varying number of buds

Treatments	Number of sprouted cuttings at 15th DAP	Survival percentage of saplings at 30th DAP	Number of leaves per sapling at 90th DAP	Length of shoot at 90th DAP (cm)
1 bud with 0 ppm of IBA	9.67	43.33	5.67	21.43
1 bud with 1000 ppm of IBA	10.33	50	6.00	22.63
1 bud with 2000 ppm of IBA	10.67	53.33	7.37	23.10
1 bud with 3000 ppm of IBA	10.00	58.33	5.00	23.10
2 buds with 0 ppm of IBA	11.00	55	6.83	23.43
2 buds with 1000 ppm of IBA	11.33	66.66	8.33	24.50
2 buds with 2000 ppm of IBA	12.00	85	9.17	24.67
2 buds with 3000 ppm of IBA	14.00	94.33	10.60	26.63
3 buds with 0 ppm of IBA	11.00	73.33	7.17	24.17
3 buds with 1000 ppm of IBA	12.33	88.33	8.50	24.77
3 buds with 2000 ppm of IBA	14.00	92.1	10.50	26.43
3 buds with 3000 ppm of IBA	14.67	96.66	9.53	25.37
4 buds with 0 ppm of IBA	11.00	73.33	7.77	24.03
4 buds with 1000 ppm of IBA	11.67	78.33	8.33	24.70
4 buds with 2000 ppm of IBA	11.00	83.33	8.83	24.57
4 buds with 3000 ppm of IBA	11.67	83.33	7.67	24.83
CD at 1 %	1.75	7.87	2.01	1.39

DAP- days after planting

number of leaves (8.92 at 90th DAP) and length of shoot (25.18 cm at 90th DAP) was observed in three budded cuttings. While, minimum number of sprouted cuttings (10.1 at 15th DAP), survival percentage (51.25 % at 30th DAP), number of leaves (6.01 at 90th DAP) and length of shoot (22.56 cm at 90th DAP) were observed in one budded cutting. With respect to various concentrations of IBA, cuttings treated with 3000 ppm of IBA were found highest regarding number of sprouted cuttings (12.5 at 15th DAP), survival percentage (82.91 % at 30th DAP) and length of shoot (24.98 cm at 90th DAP). Number of leaves were found maximum (8.96 at 90th DAP) in cuttings treated with 2000 ppm of IBA. Whereas, cuttings without any treatment observed minimum number of sprouted cuttings (10.6 at 15th DAP), survival percentage (61.25 % at 30th DAP), number of leaves (6.86 at 90th DAP) and length of shoot (23.26 cm at 90th DAP).

Table 2 represented the data with respect to interaction effect of IBA on V-1 mulberry cuttings with varying number of buds. In this, three budded cuttings treated with 3000 ppm of IBA recorded significantly maximum number of sprouted cuttings (14.67 at 15th DAP), survival percentage (96.66 % at 30th DAP). Number of leaves (10.60 at 90th DAP) and length of shoot (26.63 cm at 90th DAP) were noticed highest in two budded cuttings treated with 3000 ppm of IBA. Here we can observe that,

the results of two budded cuttings treated with 3000 ppm of IBA showed on par results with three budded cuttings treated with 3000 ppm of IBA with respect to all growth parameters. The interaction effect of the treatment recorded lowest in one budded cutting without IBA treatment with regard to number of sprouted cuttings (9.67 at 15th DAP), survival percentage (43.33 % at 30th DAP), number of leaves (5.67 at 90th DAP) and length of shoot (21.43 cm at 90th DAP).

The present results regarding number of sprouted cuttings were in agreement with the findings of Krishan [4] who has reported that the number of sprouted cuttings (8.33) of mulberry were higher in IBA (2000 ppm) treated cuttings. The increase in number of sprouted cuttings may be due to the use of IBA (4000 ppm) which caused 11 to 15% increase in total sprouting of mulberry cuttings because of early completion of physiological process involved in rooting and sprouting of cuttings [6]. Neelima et al. [7] stated that increase in number of sprouted cuttings might be due to the use of appropriate plant growth regulator (IBA) and its concentration (1500 ppm), which increase the cell division, cell elongation and early differentiation of callus tissue towards the root formation resulted in early growth of cuttings. Similar findings for survival percentage of mulberry saplings were obtained for Sokuma et al. [8] who observed that treatment of mulberry cuttings with IBA (3000 ppm) resulted in maximum survival percentage (93.33%). The increased concentration of IBA is correlated with endogenous auxins that are present in the cuttings which led to optimization of auxin levels and subsequently improved rooting and survival percentage of plants [9]. The result of the present experiment on number of leaves were similar to the work of Singh et al. [10] who observed that the mulberry cuttings of medium length (15-16 cm) resulted in maximum number of leaves (8.33) in IBA (5000 ppm) treated cuttings. The appropriate planting time, application of IBA as well as genetic makeup of genotype might have played some role in augmenting the number of leaves per sapling in IBA treated cuttings [11]. In supportive to the present investigation, Devarassou et al. [12] opined that the increase in shoot length might be due to the geotropism effects, as the nursery raised cuttings were kept at a slant position during the entire nursery period. Ismail and Asghar [13] observed that cuttings treated with IBA (4000 ppm) gave more rooting which helped in more nutrient uptake and ultimately increased the plant height.

4. Conclusion

The present study on effect of different concentration of IBA on V-1 mulberry cuttings with varying number of buds revealed that IBA played a significant role in rapid growth of mulberry saplings. On the basis of results obtained in present investigation it is concluded that two budded cuttings treated with 3000 ppm of IBA can be effectively used in areas where the propagation material is limited instead of replacing the three budded cuttings treated with 3000 ppm of IBA as both showed on par results with respect to growth parameters. So that, we can produce more number of mulberry saplings can be produced with lesser amount of planting material.

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