

Effect of Different Types of Cuttings and Indole-3-Butyric Acid (IBA) on Rooting of Damas Plant (*Conocarpus lancifolius* L.)

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ABSTRACT

An experiment consists of two types of cuttings viz. tip cutting (C_1) and semi hardwood cuttings (C_2) with different IBA concentrations i.e. 300 (I_1), 400 (I_2), 500 (I_3) and 600 (I_4) ppm each along with control (I_5) were treated. The experiment was laid out in a Randomized Block Design with Factorial Concept comprise three replications. The cuttings were planted in sand bed. Among different types of cuttings, maximum number of roots (11.03), root length (6.99 cm), fresh weight (255.60 mg/plant) of root and dry weight (27.59 mg/plant) of root along with highest rooting percent (67.14) of cuttings were recorded in tip cutting after 60 days of planting. While in case

of IBA, highest number of roots (13.23), longest root (7.66 cm), maximum fresh weight (294.33 mg/plant) of root, dry weight (27.59 mg/plant) of root and maximum rooting percentage (67.14) of cuttings were recorded under treatment of 500 ppm IBA at 60 days of planting. Interaction effect of tip cuttings along with 500 ppm IBA (C_1I_3) was also found significant for all the characters.

Keywords Conocarpus, Damas plant, IBA, Tip cutting, Semi hardwood cutting.

INTRODUCTION

Conocarpus is a genus comprise of two species i.e. *Conocarpus lancifolius* and *Conocarpus erectus*. It belongs to combretaceae family. The generic name is derived from the greek words 'konos' meaning 'cone' and 'karpos' meaning 'fruit'. It is multiple trunked shrub or small to medium sized tree about 1 to 20 m tall. The wood of this tree is dense and suitable for charcoal making and leaves contain tannin. It is a hardy tree. The tree is sometimes planted as a pioneer species in reafforestation projects in its native habitat. *Conocarpus lancifolius* is also known as damas plant and is propagated by stem cuttings.

Stem cutting is a vegetative way of plant propagation. Asexually propagated plants are genetically identical and similar to their mother plant. Cutting is the easiest and cheapest technique to mass propagation. Physiological stage of mother plant and time

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of cuttings are the important factors for success of cutting (Hartman *et al.* 2011). On the basis of plant part used and relative positions on a plant, cuttings are classified in various groups as stem cutting, root cutting, leaf cutting and leaf bud cutting. A stem cutting is any cutting taken from the main shoot of a plant or any side shoot growing from the same plant or stem. The shoots with high carbohydrate content usually root better. Broadly, there are four types of stem cuttings i.e. softwood, semi-hardwood and hardwood cuttings (Sharma and Srivastav 2004). Rooting in cutting is promoted by use of plant growth regulators like IBA, IAA, NAA.

IBA is the best auxin for general use because, it is nontoxic to plants and effective in promoting rooting of a large number of plant species. IBA is a relatively stable compound, and its shelf-life can be extended by darkness and refrigeration (Hartman *et al.* 2011). Indole-3-butyric acid (IBA) plays a key role in both root and shoots development. Concentration of IBA is vary plant to plant. Activity of growth regulators depend upon the amount of hormone applied and a particular concentration of growth regulator may be more effective for initiation of root in stem cutting.

MATERIALS AND METHODS

The present experiment was carried out at the Horticultural Polytechnic farm, Navsari Agricultural University, Navsari, Gujarat during *kharif*2020. Total 10 treatments combination of different types of cuttings viz. tip cutting (C_1) and semi hardwood cuttings (C_2) with different IBA concentrations i.e. 300 (I_1), 400 (I_2), 500 (I_3) and 600 (I_4) ppm each along with control (I_5) were taken. Cuttings were treated with different concentrations of IBA by immersing their base in IBA solutions for 10 minutes. After the treatments, these

cuttings were planted in sand bed along with control. Observations were recorded on all root parameters at 60 DAP. The observed data were statistically analyzed as per Panse and Sukhatme 1985.

Treatment combinations

C_1I_1 = Tip cutting + IBA 300 ppm

C_1I_2 = Tip cutting + IBA 400 ppm

C_1I_3 = Tip cutting + IBA 500 ppm

C_1I_4 = Tip cutting + IBA 600 ppm

C_1I_5 = Tip cutting + control

C_2I_1 = Semi hardwood cutting + IBA 300 ppm

C_2I_2 = Semi hardwood cutting + IBA 400 ppm

C_2I_3 = Semi hardwood cutting + IBA 500 ppm

C_2I_4 = Semi hardwood cutting + IBA 600 ppm

C_2I_5 = Semi hardwood cutting + control

RESULTS AND DISCUSSION

Data concerning various rooting parameters as affected by different types of cuttings, IBA concentrations and its interaction effect have been illustrated in Fig. 1.

Effect of different types of cutting

The data on different root characters showed significant effect in all the treatments (Table 1).

The results revealed that maximum number of roots (11.03) were noted in tip cutting is might be due to higher amount of rooting hormones in leaves and better mobilization of food reserves in terminal portions, along with early rooting which is cause for a higher number of roots. Tip cutting resulted

Table 1. Effect of different types of cuttings on rooting of damas plant *Conocarpus lancifolius* L.

	Number of roots	Length of root (cm)	Fresh weight of root (mg/plant)	Dry weight of root (mg/plant)	Survival percent (%)
C_1 -Tip cutting	11.03	6.99	255.60	27.59	67.14
C_2 - Semi-hardwood cutting	7.35	5.72	170.40	22.00	46.98
SEm ±	0.25	0.16	4.04	0.41	1.14
CD at 5%	0.75	0.42	12.00	1.21	3.38

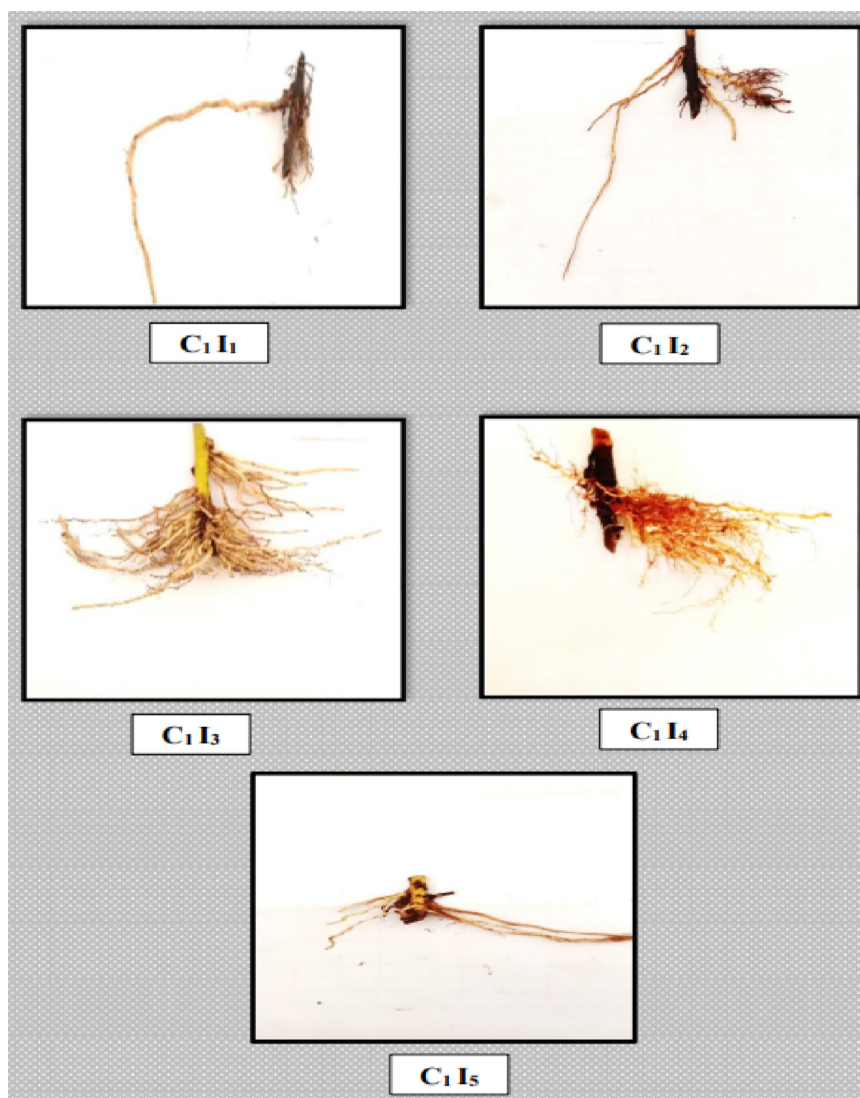


Fig. 1. Effect of different types of cuttings and IBA concentration on root characters of cutting in damas plant.

significantly maximum length of root (6.99 cm). The increased root length is due to early production of callus, differentiation of cells, greater cell elongation and differentiation of vascular tissue, which turn in favored the root growth. Tip cutting resulted significantly maximum rooting (67.14 %). Increase in rooting might be due to active development of root and shoot parameter. Similar result was also found by Rahbin *et al.* (2012) in night jasmine, Abdel-Rahman (2016) in *Conocarpus erectus*, Kumar *et al.* (2018) in

Indian borage, Kumaresan *et al.* (2019) in jasmine, Tilahun *et al.* (2019) in araucaria and Abdel-Rahman *et al.* (2020) in *Conocarpus erectus* were in favor of this result.

Effect of various IBA concentration

The results (Table 2) revealed that maximum number of roots (13.23) were noted in IBA @ 500 mg/l. The improved growth of roots noticed in damas plant

Table 2. Effect of different types of IBA concentration on rooting of *Conocarpus lancifolius* L.

	Number of roots	Length of root	Fresh weight of root (mg/plant)	Dry weight of root (mg/plant)	Survival percent (%)
I ₁ -300 ppm IBA	6.77	5.37	161.33	17.05	43.65
I ₂ -400 ppm IBA	8.97	6.65	212.00	26.76	59.92
I ₃ -500 ppm IBA	13.23	7.66	294.33	34.17	74.60
I ₄ -600 ppm IBA	12.97	7.48	293.67	33.22	74.21
I ₅ -Control	4.00	4.46	103.67	12.48	32.94
SEm ±	0.40	0.25	6.39	0.64	1.80
CD at 5%	1.19	0.73	1.98	18.98	5.35

might be attributed to enhanced tissue sensitivity and increased rooting via increased internal free IBA resulting in increased number of roots. Maximum length of root (7.66 cm) was noted at 500 mg/l IBA. The characteristic property of auxins was their action in stimulating the length of cells in their relevant growth stage. It appears likely that auxins initiate synthesis of structural enzyme proteins in the formation of adventitious root thus increasing the root length through the process of acidification. Damas plant treated with IBA @500 mg/l resulted significantly maximum fresh and dry weight of root (294.33 mg/plant and 34.17 mg/plant, respectively). Increased fresh and dry weight of roots may be the result of vascular cell differentiation and direct root development using greater IBA concentrations. Same treatment resulted significantly maximum survival percentage (74.60). This particular concentration of IBA induced maximum number of

roots with considerable length and hence, formed well developed root system for better establishment of rooted cuttings. The results are in agreement with the findings of Akhtar *et al.* (2015) in rose, Singh *et al.* (2013) in night queen, Bhandari (2014) in hibiscus and Shalini and Shukla (2020) in marigold.

Interaction effect of different types of cuttings with various IBA concentration

The results (Table 3) revealed that maximum number of roots (17.27), length of root (9.08 cm), fresh and dry weight of root (380.67 mg/plant and 38.40 mg/plant, respectively) and highest rooting percent (89.68) were noted in combine application of tip cutting with 500 ppm IBA. Combine application of tip cutting and IBA showed significant effect as auxin stimulate vegetative growth and encourage rapid

Table 3. Interaction effect of different types of cuttings with various IBA concentration on rooting of *Conocarpus lancifolius* L.

	Number of roots	Length of root (cm)	Fresh weight of root (mg/plant)	Dry weight of root (mg/plant)	Survival percent (%)
C ₁ I ₁	7.87	5.49	179.33	18.07	56.35
C ₁ I ₂	10.53	7.39	240.00	31.44	71.43
C ₁ I ₃	17.27	9.08	380.67	38.40	89.68
C ₁ I ₄	14.53	7.98	179.33	35.27	80.95
C ₁ I ₅	4.93	5.09	127.33	14.79	37.30
C ₂ I ₁	5.67	5.26	143.33	16.03	30.95
C ₂ I ₂	7.40	5.91	184.00	12.07	48.41
C ₂ I ₃	9.20	6.24	208.00	29.93	59.52
C ₂ I ₄	11.40	6.28	236.67	16.03	67.46
C ₂ I ₅	3.07	4.22	80.00	10.18	28.57
SEm ±	0.57	0.35	9.04	0.91	2.54
CD at 5%	1.68	1.03	26.85	2.70	7.56

translocation of hormones among cell enlargement and thereby improve leaf area and vegetative growth. This particular concentration of IBA induced maximum number of roots with considerable length and hence, formed well developed root system for better establishment of rooted cuttings.

CONCLUSION

On the basis of the results obtained and discussion given above, it can be concluded that as compare to non-treated cutting, IBA treated cutting is capable for increasing the number of produced roots with better survival as well as success of damas plant cutting. Among different types of cutting and various IBA concentrations, tip cutting along with 500 ppm IBA was found most effective for the rooting of *Conocarpus lancifolius* L. cutting and may be used for easy and faster multiplication.

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