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EFFECT OF VARIOUS CONCENTRATIONS OF ROOTING HORMONES ON MULTIPLICATION OF BUTTON WOOD TREE *(CONOCARPUS ERECTUS L.)*

Laveti Gowthami, B. Tanuja Priya and K. M. Yuvaraj

Horticulture College, Dr.Y.S.R.Horticultural University, Anantharajupeta, Railway Kodur, YSR Kadapa district (Andhrapradesh), India

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ABSTRACT

The present investigation entitled "Effect of IBA and NAA on vegetative propagation of button wood tree (*Conocarpus erectus* L.)" was carried out during 2019 - 2020 at Dr. Y.S.R. Horticultural University, College of horticulture, Anantharajupeta, Y.S.R Kadapa district, Andhra Pradesh. Semi hard wood stem cuttings of *Conocarpus erectus* were treated with 1000, 2000, 3000 ppm IBA and NAA solutions by quick dip method. Cuttings were then subjected to rooting in a media consisting of sandy soil, farm yard manure, single super phosphate in a ratio of 2:1:1 mixture in black polythene bags. Among all the treatments, number of sprouted cuttings, length of sprout per cutting, diameter of sprout per cutting, number of leaves per cutting, percentage of rooted cutting, number of primary roots per cutting, number of secondary roots per cutting, length of roots per cutting, number of plants transplanted and number of plants established were higher in IBA 3000 ppm.

Keywords: *Conocarpus erectus*, IBA, NAA, stem cuttings, rooting percentage

INTRODUCTION

Conocarpus erectus commonly known as buttonwood (or) button mangrove is a shrubaceous plant belonging to the family Combretaceae. This species grows on shorelines in tropical and subtropical regions around the world. *Conocarpus erectus* is usually a dense multiple trunked shrub, 1– 4 m tall, but can grow into a tree up to 20 m (or) more tall, with a trunk up to 1 m in diameter. The bark is thick and has broad plates of thin scales which are gray to brown. The twigs are brittle and angled (or) narrowly winged in cross-section. The leaves are alternately arranged, simple and oblong, 2 –7 cm long and 1–3 cm broad, with a tapering tip and an entire margin. They are dark green and shiny on top and paler with fine silky hairs underneath and have two salt glands at the base of each leaf. The flowers are button like 5 – 8 mm diameter with no petals, they are produced in stalked panicles of 35 - 56 flowers. The fruit is a cluster of red to brown, small scaly, two - winged cone-like seeds, 5 –15 mm long (Rehman *et al.,* 2019). The seed heads burst when ripe and the seeds are dispersed by water. The tree is used for ornamental purpose and widely grown as ornamental hedge as well as a bonsai plant. It is salinity tolerant tree and an important host plant for epiphytes. *Conocarpus* is widely believed to be fodder for the African buffalo and is the source of their acidic urine. The wood is sometimes used in preparations of furniture, however difficult to work but takes a smooth finish. It is also used as firewood and is reported to be good for smoking meat and fish, as it burns very hot and slowly (Rahman *et al.,* 2020). It is also used to make high quality charcoal. The bark is high in tannin, for which it has been harvested commercially. This tree will help to stabilize the temperatures, improves photosynthesis, reduces noise pollution and holds off dust.

Vegetative propagation is adopted in multiplication of conocarpus plants (Rahman *et al.,* 2020). Cutting is profusely used for propagating the plant. However, it is found that rooting percentage of conocarpus is very minimum and mortality rate is also known to be very high. Further, availability of literature on propagation of button wood tree is also less. In view of this, the study on "Effect of various concentrations of rooting hormones on multiplication of button wood tree (*Conocarpus erectus* L.) was conducted during the year 2019-2020.

MATERIAL AND METHODS

The experiment was conducted at College of Horticulture, Dr. Y.S.R. Horticultural University, Anantharajupeta, Y.S.R Kadapa district, Andhra Pradesh. The experiment was replicated thrice with 7 treatments and 50 cuttings in each treatment and a total of 1050 cuttings were tested in a randomized block design (RBD). Semi hard wood cuttings of *Conocarpus erectus* were collected from 6 to 7 year old plants. Six to eight months old mature shoots of 15 - 20 cm length, 10 -12 mm in diameter with 3- 4 healthy buds were selected for cuttings. Care was taken to ensure that the shoots were cleanly cut at an angle of 45° with a sharp knife without bark split. For preparing the rooting media, sandy soil, farm yard manure and single super phosphate in the ratio of 2:1:1 were mixed thoroughly, cleaned for stones and grasses and then the mixture was filled in polybags. The basal ends of the cuttings were dipped in different concentrations *viz*., 1000 ppm, 2000 ppm and 3000 ppm of solutions of indole-3-butyric acid (IBA) and naphthalene acetic acid (NAA) along with control. The basal end of cuttings were quickly

Table 1: Effect of IBA and NAA on vegetative propagation through semi hard wood stem cuttings of *Conocarpus erectus*

Treatments	Number of sprouted cuttings	Length of sprout per cutting (cm)	Diameter of sprout per cutting (mm)	Number of leaves per cutting	Percentage of rooted cutting	Number of primary roots	Number of secondary roots	Length of roots per cutting (cm)	Number of plants transplanted	Number of plants established
IBA 1000 ppm	38.66	10.70	1.43	5.00	44.33	7.00	17.33	6.00	29.66	25.66
IBA 2000 ppm	43.33	9.40	1.90	6.00	53.66	11.00	26.66	7.16	39.00	36.00
IBA 3000 ppm	46.66	15.13	2.50	8.00	93.33	16.00	31.33	11.56	42.33	40.33
NAA 1000 ppm	42.33	8.00	1.40	3.00	53.00	7.66	15.00	5.96	35.00	33.00
NAA 2000 ppm	36.66	9.00	1.33	3.33	48.66	7.33	17.33	6.03	32.66	30.33
NAA 3000 ppm	40.33	11.60	1.36	4.00	52.33	7.33	24.00	8.60	28.66	25.66
Control	32.33	7.50	0.86	2.33	27.66	6.00	10.33	4.50	25.00	23.00
CD at 5%	1.46	0.41	0.19	1.60	2.74	1.91	3.18	0.29	3.17	3.04
SE (m)	0.47	0.13	0.06	0.51	0.88	0.61	1.02	0.09	1.02	0.97
SE (d)	0.66	0.18	0.09	0.72	1.24	0.87	1.44	0.13	1.44	1.38
CV %	2.03	2.24	7.16	19.69	2.86	11.96	8.72	2.28	5.32	5.53

dip in solutions for 10 seconds and then the treated cuttings were immediately planted in 15 x11 cm size polybags and inserted at 7.5 cm depth in the rooting media.

RESULTS AND DISCUSSION

A perusal of data presented in Table 1 showed that the hormone and their doses significantly affected the studied growth characters.

The maximum (46.66) number of sprouted cuttings were recorded in 3000 ppm concentration of IBA treatment, followed by 2000 ppm concentration of IBA and 1000 ppm concentration of NAA. The minimum (32.33) number cuttings sprouted in control set. Similar findings were also observed by Dhua *et al.,* (1982) in guava cuttings. According to Thimmappa and Bhattacharjee (1950), auxins naturally occurring (or) exogenously applied are required for initiation of adventitious roots on stems. It appears probable that the success of IBA is due to its low auxin activity and its slow degradation by auxin destroying enzyme. Leopold (1995) suggested that IBA is quite a strong auxin, while NAA is readily destroyed. The results of Singh and Kumar (2014) in mulberry were found to corroborate with the results of present study.

The maximum length of sprout per cutting (15.13 cm) was recorded in 3000 ppm IBA followed by 3000 ppm NAA, while, the minimum average length of sprout per cutting (7.5 cm) was recorded in the control. The maximum average diameter of sprout per cutting (2.5 mm) was observed in 3000 ppm of IBA followed by 2000 ppm of IBA. The minimum average diameter of sprout per cutting (0.86 mm) was recorded in the control. The maximum number of sprouts per cutting with optimum IBA treatments might be ascribed to better root growth which augmented absorption and translocation of nutrients from soil that take active part in various plant metabolic processes (Singh, 2001). These finding were similar to Singh (2013) in *Citrus limon* with respect to average length and diameter of sprouts per cutting.

The number of leaves per cutting (8.00) were maximum in 3000 ppm of IBA, followed by 2000 ppm of IBA. The minimum (2.33) number of leaves per cutting were recorded in control. Increase in leaf number may be due to vigorous rooting induced by the growth regulator enabling the cuttings to absorb more nutrients and thereby producing more leaves as reported by Stancato *et al.,* (2003).

Among the various concentrations of hormones, 3000 ppm concentration of IBA showed the highest percentage of rooted cutting (93.33), followed by IBA 2000 ppm (53.66) and NAA 1000 ppm (53.00) while, the minimum percentage of rooted cutting (27.66) was recorded in the control. These findings also found to agree with the finding of Panwar *et al.,* (1994) and Singh *et al.,* (2011) in bougainvillea.

The highest number of primary root per cutting

(16.00) was recorded at 3000 ppm concentration of IBA, while the lowest number of primary root per cutting (6.00) was recorded in control treatment (Table 1). According to Bose *et al.,* (1968) cutting of bougainvillea and other ornamental shrub species produced large number of roots, weight of fresh and dry root when treated with IBA at 3000 - 6000 ppm. The enhanced hydrolytic activity in presence of applied IBA coupled with appropriate planting time might be responsible for the increase number of primary root per cutting (Ghosh *et al.,* 2017).

The maximum number of secondary roots per cutting (31.33) was recorded under 3000 ppm concentrations of IBA followed by 2000 ppm concentration of IBA, while the minimum number of secondary roots per cutting (10.33) was recorded under control treatment. IBA treatment also shortened the time required for root formulation in hard to root species. The above findings also agreed with the finding of Sulusoglu and Cavusoglu (2010) in *Cherry laurel* (*Prunus laurocerasus*) in respect of average number of primary and secondary roots per cutting.

The maximum length of roots per cutting (11.56 cm) was recorded under 3000 ppm concentration of IBA followed by 2000 ppm concentration of IBA, while the minimum average length of roots per cutting (4.50 cm) was recorded under control treatment. Auxin application has been found to enhance the histological features like formation of callus and tissue and differentiation of vascular tissue (Mitra and Bose 1954). These findings agreed with the finding of Galavi *et al.,* (2013) in Grape and Singh *et al.,* (2013) in *Thuja compecta* with respect to average length of root per cutting.

The maximum number of plants transplanted (42.33) was recorded under 3000 ppm concentration of IBA followed by 2000 ppm concentration of IBA, while the minimum number of plants transplanted (25.00) was recorded under control treatment. The maximum number of plants established (40.33) was recorded under 3000 ppm concentration of IBA followed by 2000 ppm concentration of IBA, while the minimum number of plants established (23.00) was recorded under control treatment.

CONCLUSION

Plants can be transplanted on rooting, but good results are often achieved if the plants do not have too many longer roots but have more number of roots. Application of IBA at higher concentration (3000 ppm) was more beneficial for over all parameters of *Conocarpus erectus*. Hence 3000 ppm concentration of IBA was found most effective for the rooting of *Conocarpus erectus* semi hard wood cutting and may be used in nurseries for its easy and faster multiplication.

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