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SHORT COMMUNICATION

EFFECT OF GROWTH REGULATORS AND PLANTING MEDIA ON ROOTING OF CUTTINGS *IN NOTHOPODYTES NIMMONIANA* MABBERLY

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Nothopodytes nimmoniana **mabberly of family Icacinaceae is one among the important medicinal plants, having enormous potential to cure cancer. Efforts were made to propagate this important tree through cuttings. Soft wood cuttings, semi-hardwood cuttings and hardwood cuttings were dipped in powder and liquid forms of 1000, 2000, 3000 and 4000 ppm concentrations of IAA and IBA by quick dip method and then planted in polythene bags filled with sand, vermiculite and pot mixture. Rooting of cutting was best achieved on sand medium followed by vermiculite and potting mixture. Treatment with 2000 ppm IBA in talc form in softwood cuttings, 3000 ppm IBA talc form in semi-hardwood cuttings and 4000 ppm IBA talc form in hardwood cuttings registered maximum sprouting, rooting, root length, shoot length, number of roots per cutting and survival percentage. In all, the best results were obtained in semi-hardwood cuttings treated with 3000 ppm IBA in talc form planted in sand medium.**

Key words **: Cancer, IBA, sand medium, semi-hardwood cuttings.**

Nothopodytes nimmoniana Mabberly. (Syn. *N. foetida, Mappia foetida)* belonging to family Icacinaceae is one among the important medicinal trees, having great potential to cure cancer. It is a medium sized tree found in specific areas of North-east India and Western parts of Deccan peninsula. Anti-tumourous alkaloids such as Camptothecin, 9-methoxycamptothecin and 20-0-acetyl camptothecin are extracted from bark, roots, wood chips and leaves (Das *et al.* 1997). The active principle of the wood – camptothecin (CPT), is known as potent drug that breaks single strand DNA in the mammalian system and is found to be useful in the treatment of tumours (Wall *et al.* 1966, Gonvindachari and Viswanathan 1972, Creemers 1996, Dancey and Eisenhauer 1996). CPT is also known to inhibit retroviruses such as human immunodeficiency virus (HIV) and equine infectious anemia virus (Priel *et al.* 1991). It is believed that CPT is the third most important alkaloid sought after by the pharmaceutical companies around the world. Perhaps this has led to the large-scale exploitation of the species from its wild habitats in the recent years. The export data recorded at the Bombay port during 1994 showed the export of wood chips of this species to the tune of 54 tonnes (dry) (Ved 1997). An alarming upswing of more than 20 per cent in its destruction over the last 10 years has put the species in the threatened status VU (R) i.e. vulnerable at the regional level (South India). Further the species is becoming endangered due to its confinement to restricted areas, problems in regeneration as seeds lose viability quickly and has low germinative capacity leading to poor natural regeneration.

To overcome these inherent biological problems connected with seeds, vegetative propagation could serve as a potential means for production of quality planting stock. Against this backdrop present investigations were carried out to develop a protocol for vegetative propagation of this important medicinal tree.

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The present investigations were carried out at Forest College and Research Institute, Mettupalayam (11º16'N, 76º56'C and 300 m amsl) during March to August 1999. Cuttings of different categories, viz. softwood, semi-hardwood and hardwood cuttings were collected during summer (March-April) from trees growing in Coonoor range of Nilgiris North Forest Division and were carried in ice box to Forest College and Research Institute, Mettupalaym. Stem cuttings of 15-20 cm lengths were prepared from softwood, semi-hardwood and hardwood material and dipped in one per cent bavistin (fungicide) for few minutes. Then cuttings were washed and treated with auxins (quick dip method) IAA and IBA in liquid and talc form at 1000 ppm, 2000 ppm, 3000 ppm and 4000 ppm concentrations. After this cuttings were planted in 15 x 25 cm polythene bags containing sand, vermiculite and pot mixture and kept in mist chamber (maintained at 25-30ºC with a humidity of 80-90%). Cuttings dipped in distilled water served as control. The experiment was conducted in randomized block design. Three replicates each of nine cuttings were planted for each treatment. Observations were made for number of cuttings sprouted, number of cuttings rooted, root length, shoot length and survival percentages at 165 days after planting.

The present study revealed that semi-hardwood cuttings produced higher sprouting (76.66%) and rooting (48.00%) than softwood and hardwood cuttings. Furthermore, rooting treated with IBA 3000 ppm in talc form was more effective than liquid form of the same concentration and also in comparison with IAA (Table 1). The superiority of IBA in promoting rooting than other growth regulators is well documented by many workers in different species (Bulgannawar *et al.* 1992, Bhardwaj *et al.* 1993, Mishra *et al.* 1994, Shah *et al.* 1994, Rao *et al.* 1999, Sharma and Pandey 1999). Effect of IBA to increase rooting of stem cuttings had already been advocated by Goel *et al.* (1997) in *Prosopis juliflora*, Meenu *et al.* (1997) in *Azadirachta indica*, Reeves *et al.* 1996) in *Parkia biglandulosa*, Moorthy (1992) in *Givotia rootleriformis*, Verma *et al.* (1996) in *Acacia catechu* and Zeng *et al.* (1995) in *Eucalyptus grandis.* The pronounced effect of IBA in talc form in promoting rooting and sprouting than cuttings treated with IBA of the same concentration in liquid form may be due to the persistent effect of IBA on the cutting surface over a long period of time.

The physiological property of IBA is to enhance cell division and cell enlargement there by favouring root growth. In the present investigation cuttings treated with IBA 3000 ppm talc form initiated more number of roots (26.66) and high shoot length (96.66 cm) in comparison to that of IAA of the same concentration and form. Considering the growth regulators and their concentrations, IBA 3000 ppm in talc form reigned supreme in respect of all characters, viz., per cent of rooting of cuttings, shoot length, root length and number of roots per cutting (Table 1). The superiority of 3000 ppm IBA talc form has been documented in several species like *Alstonia scholaris* (Rao *et al.* 1999) and *Eucalyptus tereticornis* (Bulgannawar *et al.* 1992).

It was also observed that plants treated with IBA 3000 ppm in talc form survived better (70.83%) than other rooted cuttings from other treatments (Table 1). Similar studies were conducted and reported by Sharma and Pandey (1999) in *Dalbergia latifolia* and *D. sissoo.* Among the different types of cuttings taken for the study, it was observed that semi-hardwood cuttings responded well to all the treatments. In softwood cuttings, though good sprouting was noticed during the early stages in 2000 ppm IBA talc form, it failed to survive. Similarly hardwood cuttings treated with 4000 ppm in talc form showed good response, however, after 45 days of sprouting the cuttings failed to survive. Good survival of semi-hardwood cuttings was much pronounced in 3000 ppm IBA talc form. This may be due to the fact that the cells being semi-lignified and less differentiated, more cells are available for becoming meristematic for root initiation, than hardwood and softwood, as reported by Hartmann *et al.* (1997).

Propagation of tree species through stem cuttings is a function of several factors, one of which is the medium of propagation (Hyun 1967, Nanda 1970, Gurumurthi *et al.* 1984, Mitter and Sharma 1999). Porosity is one of the important physical properties in a growing media because it determines the space available in container for air, water and root growth (Leigel and Venator 1987). Among the media evaluated for rooting, highest root length (33.86 cm) was observed in vermiculite medium whereas highest rooting percentage (48.00%) was observed in sand medium (Table 1). Reports about vermiculite enhancing root length than the number was also reported by Kesava Reddy *et*

Table 1. Effect of plant growth regulators and type of cutting on sprouting, rooting, root length (cm), shoot length (cm) and survival percentage in *Nothopodytes nimmoniana.*

Treatment	Spouting percentage			Rooting percentage			Shoot length (cm)			Root length (cm)			Survival percentage		
	SW	SHW	HW	SW	SHW	HW	SW	SHW	HW	SW	SHW	HW	SW	SHW	HW
Control	47.00	52.00	44.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IBA talc															
1000 ppm	53.3	70.66	53.33	13.33	28.00	13.33	28.66	50.00	25.33	15.33	16.4	11.06	59.90	60.87	37.50
2000 ppm	63.66	68.00	53.33	25.33	37.33	16.00	36.80	57.46	28.40	14.73	25.73	13.46	62.70	67.23	43.83
3000 ppm	56.00	76.66	53.33	22.66	48.00	33.33	25.46	96.66	37.26	13.33	52.73	13.46	57.90	70.83	47.17
4000 ppm	53.33	70.66	57.33	16.00	41.33	37.33	20.80	68.26	38.53	10.93	18.80	14.40	55.60	63.53	51.57
IBA liquid															
1000 ppm	53.33	68.00	42.66	21.33	25.33	12.00	28.13	49.86	30.40	15.50	10.53	12.40	46.03	50.83	40.27
2000 ppm	56.00	55.33	44.00	25.33	32.00	12.00	32.93	59.20	33.33	13.06	14.66	12.93	52.37	56.87	42.87
3000 ppm	46.66	70.67	46.66	18.66	40.00	14.66	28.86	87.60	34.93	12.26	21.33	14.26	44.70	67.00	45.90
4000 ppm	44.00	64.00	51.33	13.33	36.00	17.33	25.73	69.20	36.13	11.93	17.20	14.66	42.07	61.83	49.23
IAA talc															
1000 ppm	44.66	72.66	42.66	21.33	22.66	10.66	26.00	78.53	28.40	13.46	14.80	10.53	45.93	52.80	42.47
2000 ppm	57.33	70.66	44.00	22.33	30.66	10.66	28.00	84.66	30.26	12.40	15.60	11.33	55.03	49.20	44.07
3000 ppm	52.00	71.33	48.00	20.00	38.66	16.66	23.80	87.66	32.00	13.66	20.53	12.66	51.67	68.63	45.83
4000 ppm	49.33	65.33	49.33	11.33	34.66	17.33	23.40	83.20	33.60	12.26	16.93	13.46	49.80	62.50	50.40
IAA liquid															
1000 ppm	53.33	64.33	38.66	18.66	21.33	06.66	31.50	40.60	25.33	15.60	13.06	11.60	44.90	55.13	41.03
2000 ppm	56.00	69.33	40.00	21.33	21.33	06.66	28.66	52.66	27.66	15.20	17.06	12.66	51.26	59.16	43.56
3000 ppm	54.66	70.66	45.33	16.00	37.33	13.33	25.26	59.33	31.33	14.13	22.40	13.33	49.06	64.40	44.73
4000 ppm	53.33	65.33	50.66	13.33	33.33	20.00	23.86	60.66	32.53	14.00	17.33	14.13	46.60	60.13	48.60
Cuttings			0.89			0.77			0.38			0.53			0.73
Treatment			2.12			1.85			0.91			1.27			1.74
Cuttings X Treatments			3.68			3.20			1.58			2.21			3.03

SW-Softwood cuttings, SHW-Semi hardwood cuttings, HW-Hardwood cuttings

al. (1994) in cuttings of *Sterculia urens.* It was also observed that the shoot length was highest (96.66 cm) in cuttings treated with 3000 ppm IBA talc form planted in sand medium. The factor responsible for increased shoot length may be due to more quantity of IBA transported to the upper part of the cuttings owing to more number of roots which serve as an auxin source for shoot development.

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