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EFFECT OF IBA CONCENTRATION ON INDUCING ROOTING IN STEM CUTTINGS OF *Thuja compecta* UNDER MIST HOUSE CONDITION

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ABSTRACT: The experiment was carried out in randomized block design at Horticultural Research Centre, Chauras Campus, HNB Garhwal University Srinagar (Garhwal), Uttarakhand, India. Softwood cuttings of T. compecta were collected from 3 to 4 year old plants and 15 cm long cuttings with apical portion. The cuttings were treated with 1, 2, 3, 4 and 5g L^{-1} IBA solutions by quick dip method. Vermicompost was used as the rooting media. The temperature of the vermicompost was 26 2°C. Experiment was conducted in the mist house. Among all the treatments, highest number of root per cutting (19.67) was recorded under 5g L^{-1} IBA concentration. The maximum length of roots per cutting (9.33 cm) was recorded under 2g L^{-1} IBA concentration. The maximum diameter of root per cutting (0.20 cm) was observed in 4g L^{-1} and 5g L^{-1} IBA concentration. Maximum (82.70%) roots per rooted cutting was observed in 5g L^{-1} IBA concentration. The minimum (23.67 days) taken to callus formation was noticed in 4g L^{-1} IBA concentration.

Keywords : *Softwood cutting, IBA, Thusa compecta, rooting per cent, quick dip.*

Thuja compecta, commonly known as White-Cedar or Arborvitae or Northern White-Cedar, a member of Cupressaceae family is a native to North America. Thuja plants are planted in parks and gardens, due to its decorative aspect and can be easily modeled into different and desired shapes. In ornamental arrangements it is usually found as shrub reaching upto 20 m heights. The characteristics of this plant are erect stalk, with reddish-brown bark that exfoliates in long stripes. The pyramid shaped corona consists of a great number of branches almost equal in length. The stems are compressed, disposed horizontally and oblique, dark green on the upper part and light green on the back side without any white spots. The scale-shaped leaves are oppositely disposed presenting on the back side a prominent resin gland. During winter the foliage turn into a rusty colour. Flowers are unisexual – monoecious and the cones are narrow and oval-shaped, 1-1.5 cm long, having about 3-6 pairs of imbricated, shinny, yellowish-brown, dry, mucronated scales Thuja is an ancient remedy for several types of ailments, this preparation should be used with caution due to its strength and toxic properties. *T. occidentalis* is widely used as an ornamental tree, particularly for screens and hedges, in gardens, parks and cemeteries. Occasionally thuja trees are propagated through seeds, but can also be easily propagated using vegetative methods, the most common being heel cuttings (Posta and Hernea, 9).

Hardwood cuttings of *T. occidentalis* can be rooted in midwinter under mist in the greenhouse. Best rooting is often found with cuttings taken from older plants that are no longer making rapid growth. The cuttings should be about 20 cm (6 inch) long and may be taken either from succulent, vigorously growing terminals or from more mature side growth several years old. Wounding and treating with 3,000 to 8,000 ppm IBA quick-dip or talc is beneficial. No shading should be used. Cuttings may also be made in midsummer and rooted out-of-doors in a shaded, closed frame.

Overall rooting for softwood, semi-hardwood, and hardwood, cuttings was 85%, 86%, and 96%, respectively. Semi-hardwood cuttings were the only cuttings in which percent rooting was affected by IBA treatment or cutting type, with lateral cuttings rooting in higher percentages than terminal cuttings (92% vs. 79%, respectively), while IBA

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concentrations of 3000 (0.3%) or 6000 ppm (0.6%) proved optimal for both cutting types (Griffin *et al.,* 4).

MATERIALS AND METHODS

The present investigation was conducted in the mist house located at the Horticultural Research Centre, HNB Garhwal University, Srinagar Garhwal, Uttarakhand, India. The research centre is situated in the Alaknanda valley at 30° 13' 25.26'' N and 78° 48' 04.93'' E and 563 m above mean sea level, and exhibits a subtropical climate with dry summer and rigorous winters with occasional dense fog in the morning hours from mid December to mid February. The average temperature and relative humidity inside the mist house during experiment was 35 3°C and 75 5%, respectively. The soil temperature measured was around 26 2°C. Softwood cuttings of T. compecta were collected from 3 to 4 year old plants and 15 cm long cuttings with apical portion. Vermicompost was used as the rooting media. It was filled in the root trainers of size 15 15 cm. There were six treatments of growth regulator formulations used at different concentrations; twenty cuttings were used for each treatment which was replicated thrice. The prepared cuttings were planted in pots after dipping in solutions of IBA at 1g L^{-1}, 2g L^{-1}, 3g L^{-1}, 4g L^{-1} and 5g L^{-1}. The experiment was laid out in randomized block design and replicated thrice with 10 cuttings in each treatment. Experiment was conducted in the mist house which had the arrangement for intermittent misting to 60 seconds at every 10 minutes interval between 8 AM and 8 PM. The basal 1.5-2.0 cm portion of the cuttings was dipped in growth regulator solution for 10 minutes and immediately planted in medium to a depth of 6-8 cm. After cuttings were planted, the misting was started. The planted cuttings were allowed to root for 90 days. The cuttings (nine numbers per treatment per replication) were carefully removed from the pots and dipped in water to remove the soil particles adhering to roots to record the observations pertaining to roots viz., days taken for callus formation, total length of cutting, number of roots/cutting, length of roots/cutting, diameter of roots/cutting and percentage of cutting rooted. The data recorded were subjected to statistical analysis for least significant difference (RBD) as described by Snedecor and Cochran (12).

RESULTS AND DISCUSSION

A perusal of Figure 1 and Table 1 shows that the effect of different concentrations of IBA significantly affected the various growth characters of leafy cuttings in *Thuja compecta.*

Among IBA concentrations, 5g L^{-1} concentration of IBA showed the highest percentage of rooted cutting (82.700%) followed by 4g L^{-1} concentration of IBA. The minimum percentage of rooted cutting (7.167%) was recorded under control. The enhance hydrolytic activity in presence of applied IBA coupled with

Table1: Effect of IBA concentration on rooting of *Thusa compecta.*

Treatment	Total length of cutting	Number of roots	Length of roots	Diameter of root	Rooting %	Callus
IBA 1g L^{-1}	29.333^{a}	0.667^{b}	0.967^{c}	$0.067b^{c}$	45.433^{e}	53.000^{b}
IBA 2g L^{-1}	31.000^{a}	8.667^{b}	9.333^{a}	0.133^{b}	54.333^{d}	49.667^{c}
IBA 3g L^{-1}	26.667^{a}	7.000^{b}	8.000^{a}	0.167^{a}	66.733^{c}	30.000^{d}
IBA 4g L^{-1}	27.667^{a}	7.667^{b}	4.667^{ab}	0.200^{a}	80.000^{b}	23.667^{e}
IBA 5g L^{-1}	29.000^{a}	19.667^{a}	5.767^{ab}	0.200^{a}	82.700^{a}	25.000^{e}
Control	26.833^{a}	0.333^{b}	0.333^{c}	0.033^{c}	7.167^{f}	69.333^{a}
CD (P = 0.05)	8.087	9.898	5.277	0.088	2.057	3.232

Means followed by same letter within each column are not significant (P < 0.05).

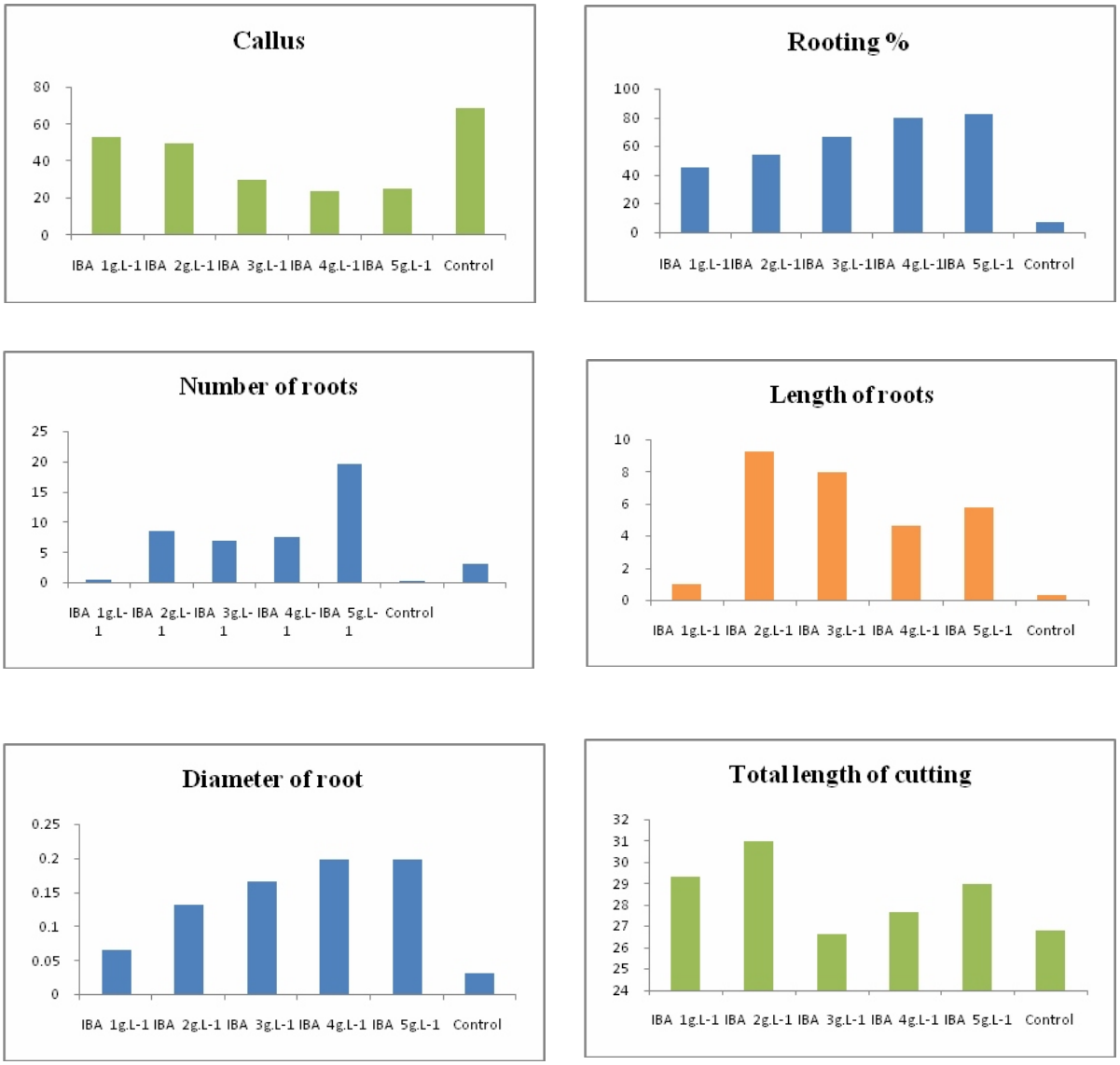

Figure 1: Effect of IBA on callus formation, rooting %, number of roots, length of roots, diameter of roots and total length of cutting in Thuja compecta cuttings.

appropriate planting time might be responsible for the increased percentage of rooted cuttings. High carbohydrate and low nitrogen have been reported to favour root formation (Carlson, 2). These finding are agreed with the finding of Bose *et al.* (1) in *Bougainvillea.*

The maximum average length of roots per cutting (9.333 cm) was recorded under 2g L^{-1} concentration of IBA followed by 3g L^{-1} concentration of IBA, while the minimum average length of roots per cutting (0.333 cm) was recorded under control set. Auxin application has been found to enhance the histological features like formation of callus and tissue and differentiation of vascular tissue (Mitra and Bose, 7). These finding were

Plate 1: Root formation in Thusa compecta with IBA treatments.

similar to Panwar *et al*. (8) in *Bougainvillea* cv. Alok with respect to length of roots per cutting.

The highest number of root per cutting (19.667) was recorded under IBA 5g L^{-1} concentration of IBA followed by IBA 2g L^{-1} concentration of IBA while the minimum number of root per cutting (0.333) was recorded under control during present investigations. 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 (Carlson, 2). These finding are agreed with the finding of Bose *et al.* (1) and Singh *et al.* (11) in *Bougainvillea*, with respect to highest number of root per cutting.

The maximum average diameter of thickest root (0.200 cm) was recorded under 4g L^{-1} and 5g L^{-1} concentration of IBA followed by 3g L^{-1} concentration of IBA and the minimum average diameter of thickest root (0.033 cm) was recorded under control. According to Thimmappa and Bhattacharjee (13), 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. These finding are agreed with the finding of Mahros (5) in *Bougainvillea glabra* cv. Variegate.

Among IBA concentrations, 2g L^{-1} concentration of IBA showed the total length of cutting (31.000 cm) followed by 1g L^{-1} concentration of IBA. The minimum total length of cutting (26.667 cm) was recorded under 3g L^{-1} concentration of IBA. The findings of Singh *et al.* (10) also reported similar results in respect to total length of cutting.

The minimum days (23.67 days) taken to callus formation in softwood cuttings of T. compecta was noticed under IBA concentration at 4g L^{-1} and maximum days (69.34 days) taken was found with control set of cuttings after insertion in to the rooting medium. Auxin application has been found to enhance the histological features like formation of callus and tissue and differentiation of vascular tissue (Mitra and Bose, 7). These finding

are agreed with the finding of Mishra and Sharma (6) in *Bougainvillea* cv. Dr. R. R. Pal.

CONCLUSION

Among various concentration of IBA, 5g L^{-1} concentration of IBA show the best performance in terms on highest percentage of rooted cutting, highest number of root per cutting, maximum average diameter of thickest root while average length of root per cutting, total length of cutting was recorded under 2g L^{-1} concentration of IBA. Hence 5g L^{-1} IBA was found most effective for the rooting of Thuja cutting and may be used by nursery man for easy and faster multiplication of Thuja compecta.

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