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Effect of IBA and types of cuttings on rooting of Ixora

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Abstract
The study was conducted to find out "Effect of Indole butyric acid (IBA) on cutting on rooting of Ixora" at farm of Horticulture Section, College of Agriculture, Nagpur in 2019-2020. The experiment was laid out in Factorial Completely Randomized Design with fifteen treatments and three replications. The treatments comprised three types of cuttings i.e. Softwood cuttings, Semi hardwood cuttings and Hardwood cuttings and five concentrations of IBA, 0 ppm, 1000 ppm, 2000 ppm, 3000 ppm, 4000 ppm. The result obtained from the present investigation in respect of root parameters, it was observed that, minimum days to rooting was observed in treatment T_{13} (hardwood cuttings treated with IBA 2000 ppm). However, maximum number of roots cutting^{-1}, length of main root, survival percentage of rooted cuttings, root volume, fresh weight of roots cutting^{-1} and dry weight of roots cutting^{-1}was noticed in hardwood cuttings with 2000 ppm IBA.

Keywords: IBA, propagation, cutting, Ixora, days to rooting, survival percentage

Introduction
Ixora (*Ixora coccinea* L.) is a popular hedging plant in subtropical regions of India. Ixora, acquired from Sanskrit 'IKVANA' name of Malaysian Deity which means Iswara to whom flowers were offered. Coccinea means scarlet coloured. Hindus think the bush as scared to Shiva and Vishnu. It is a dense, multi-branched evergreen shrub, usually grows up to a height of 1.2–2 m, but able attain 3.6 m high. It is otherwise known as West Indian Jasmine and belongs to the family Rubiaceae. The plants have leathery leaves and produce large clusters of tiny flowers. They produce orange, gold, pink and red flower and it's also known as "Jungle flame" and "flame of the woods". Flowers are suitable for indoor decoration, as they remain fresh for a long time after plucking and have great economic importance through good aesthetic beautification of the environment. Ixora is a moderate to root plant species and rooting ability is moderate under natural conditions. Adventitious root formation is a key step in vegetative propagation of woody or horticultural species and problems associated with rooting of cuttings frequently result in significant economic losses. The hormone, that stimulates the growth of adventitious roots is called auxin, commercially in the form of Indole butyric acid (IBA) and Napthalene Acetic Acid (NAA). Effect of auxin on initiation of rooting of cuttings of horticultural crops has been reported by many workers. Among the various vegetative methods, propagation by stem cutting is the most successful, convenient and economical method of propagation.

Materials and Methods
An experiment entitled, "Propagation studies in Ixora", was conducted at an experimental field of Horticulture Section, College of Agriculture, Nagpur, during Kharif season of the year 2019-2020. The experiment was laid out in a factorial completely randomise design (FCRD) with 15 treatment combinations which were replicated thrice. The present experiment was conducted in plastic carats having size of 36 x 56 x10 cm^3. The carats were filled with propagation media of 2:1:1 ratio of sand, well decomposed farm yard manure (FYM) and silt. The mixture was filled in each carats. The uniform cuttings were selected. Copper oxychloride was used as a fungicide to check the fungus attack. The planting media was of moderate

fertility having pH value 7.5. The three types of cuttings were selected for planting i.e. softwood, semi-hardwood and hardwood cuttings. The cuttings were treated for 30 minute with different concentrations of IBA i.e. 1000 ppm, 2000 ppm, 3000 ppm and 4000 ppm and control (water dipping). Observation starting from 30 days after planting up to 120 DAP.

Results and Discussion

Effect of cuttings

The data in respect of days to rooting of cuttings, hardwood cuttings of Ixora shows minimum days C_3 (27.73 days) to rooting which was significantly superior over semi hardwood cuttings C_2 (35.93 days) and softwood cuttings C_1 (40.93 days).Similar results were also recorded by Gupta (1989) in hibiscus.

As regards number of roots per cutting, was significantly influence by different types of cuttings. Hardwood cuttings of Ixora recorded maximum number of roots cutting^{-1} C_3 (7.24 roots) which was significantly superior over semi-hardwood cuttings C_2 (4.35 roots) and softwood cuttings C_1 (3.00 roots) which shows that the hardwood cuttings are best for commercial propagation of Ixora. Similar results were observed by Thakor *et al.* (1996) [22] in Ixora and Ramesh kumar (2002) [17] in bougainvillea.

The data in respect of length of roots of cuttings, the maximum root length C_3 (7.04 cm) was recorded in hardwood cuttings which was significantly superior over semi-hardwood cuttings C_2 (6.38 cm) and softwood cuttings C_1 (3.14 cm). These results are in close conformity with the findings of Ramesh Kumar (2002) [17] and Sahariya *et al.* (2013) [18] in bougainvillea.

The data in respect of survival percentage of cuttings, the maximum survival percentages of cuttings C_3 (62.33%) was observed in hardwood cuttings which was significantly superior over remaining types of cuttings such as semi-hardwood cuttings, C_2 (49.06%) and softwood cuttings, C_1 (36.86%) respectively. Similar results were stated by Gupta (1989) in hibiscus.

The data in respect of root volume, the maximum root volume C_3 (5.80 ml) was recorded in hardwood cuttings which was significantly superior over semi-hardwood cuttings C_2 (3.69 ml) and softwood cuttings C_1 (1.58 ml).

As regards fresh weight of roots, the maximum fresh weight of roots was recorded in hardwood cuttings C_3 (3.71 g) which was significantly superior over semi-hardwood cutting C_2 (2.92 g) and softwood cuttings C_1 (1.69 g) respectively. Similar results were also recorded by Parminder and K. Singh (2003) [14] in bougainvillea.

The data in respect of dry weight of roots, maximum dry weight of roots was recorded in hardwood cuttings C_3 (2.24 g) which was significantly superior over semi-hardwood C_2 (1.50 g) cuttings and softwood cuttings C_1 (0.67 g) respectively. Similar results were also recorded by Parminder and K. Singh (2003) [14] in bougainvillea and Hamid Babaie *et al.* (2014) [5] in *ficus benjamina.*

Table 1: Effect of indole butyric acid (IBA) and types of cuttings on rooting of Ixora

Treatments	Days to rooting	Number of roots	Length of main root (cm)	Survival percent (%)	Root volume (ml)	Fresh weight of root (g)	Dry weight of root (g)
Cutting							
C_1- Softwood	40.93	3.00	3.14	36.86	1.58	1.69	0.67
C_2-Semi-hardwood	35.93	4.35	6.38	49.06	3.69	2.92	1.50
C_3- Hardwood	27.73	7.24	7.04	62.33	5.80	3.71	2.24
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
S.E (m)±	0.37	0.05	0.07	1.00	0.05	0.04	0.02
C.D at 5%	1.08	0.14	0.22	2.90	0.16	0.12	0.06
IBA concentration							
A_0- 0 PPM	40.66	3.81	4.73	37.44	2.63	1.95	1.04
A_1- 1000 PPM	32.22	5.30	5.80	48.11	4.01	2.95	1.60
A_2- 2000 PPM	30.77	5.76	6.37	60.33	5.13	4.05	2.01
A_3- 3000 PPM	34.66	4.81	5.51	55.22	3.55	2.61	1.40
A_4- 4000 PPM	36.00	4.56	5.20	46.00	3.14	2.31	1.32
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m) ±	0.40	0.06	0.09	1.29	0.07	0.06	0.03
CD at %	1.40	0.18	0.28	3.74	0.22	0.18	0.09
Interaction C x A							
F test	Sig.	Sig.	N.S.	N.S.	N.S.	N.S.	N.S.
SE (m) ±	1.02	0.13	0.20	2.74	0.16	0.13	0.07
CD at %	2.97	0.39	--	--	--	--	--

Effect of IBA

The cuttings treated with A_2 (IBA 2000 ppm) required minimum number of days (30.77 days) to rooting of cuttings which was followed by the treatment, A_1 (IBA 1000 ppm) (32.22 days). The maximum days to rooting of cuttings, A_0 (40.66 days) was recorded in control treatment. From the above results, it was shown that, IBA (2000 ppm) increases the number of roots and auxin are effective on initiation of rooting of cutting of Horticultural crops has been reported by many workers, (Sherer *et al.*, 1985) [20] Leaky *et al.*, 1982) [8] Similar results were also reported by Patel and Dave *et al.* (1996) [16] in Ixora and Asl *et al.* (2012) [1] in bougainvillea.

The maximum number of roots cutting^{-1} was recorded in treatment A_2 (IBA 2000 ppm) (5.76 roots) which was significantly superior over all other treatments. The minimum number of roots cutting^{-1} A_0 (3.81 roots) was recorded in control treatment. Similar results were obtained with the findings of Asl *et al.* (2012) [1] and Sahariya (2013) [18] in bougainvillea.

The treatment A_2 (IBA 2000 ppm) produced maximum root length (6.37 cm) which was significantly superior over all other treatments and minimum root length A_0 (4.73 cm) was recorded in control treatment. The similar results are also observed by Singh (1981) [7, 14, 15, 18, 19] in Ixora, Mehraj *et al.*

(2013) [10], Shiva and Nair (2008) [21] in hibiscus and Maryam Shirzad *et al.* (2012) [9] in Ficus benjamina.

The treatment A_2 (IBA 2000 ppm) recorded maximum survival percentage of cuttings (60.33%) which was statistically significant over all other treatments. The minimum survival percentage of cuttings observed in control treatment, A_0 (37.44%). The above findings were also recorded by Niaz *et al*. (2002) [12] and Mehraj *et al.* (2013) [10] in bougainvillea.

The significantly maximum root volume (5.13 ml) was recorded in the treatment A_2 (IBA 2000 ppm) which was statistically superior over all other treatments. The minimum root volume, A_0 (2.63 ml) was recorded in control treatment. The above results clearly indicated that, the root volume of plant was significantly superior in hardwood cuttings and in IBA at 2000 ppm **(**A_2). The maximum root volume in IBA (2000 ppm) might be due to proper concentration of IBA and type of cutting (hardwood cutting) as the number of root, length of root and fresh weight of root were significantly superior in hardwood cutting and IBA (2000 ppm.)

Cuttings treated with A_2 (IBA 2000 ppm) recorded significantly maximum fresh weight of roots (4.05 g) which was statistically superior over all other treatments. The minimum fresh weight of roots A_0 (1.95 g) was recorded in control treatment. Similar results were also recorded by Deshmukh and Barad (2006) [3] in bougainvillea and Karimiyan *et al*. (2013) [6] in *Ficus benjamina.*

The maximum dry weight of roots (2.01 g) was recorded in the treatment A_2 (IBA 2000 ppm) which was significantly superior over all other treatments of A_1 (IBA 1000 ppm) (1.60 g), A_3 (IBA 3000 ppm) (1.40 g), and A_4 (IBA 4000 ppm) (1.32 g) respectively. The minimum dry weight of roots A_0 (1.04 g) was recorded in control treatment. Similar results were recorded by Sahariya *et al.* (2013) [18], Nogueira *et al*. (2007) [13] in bougainvillea, Shiva and Nair (2008) [21] in hibiscus and Karimiyan *et al*. (2013) [6] in *Ficus benjamina.*

Conclusion

From the present study, it can be concluded that, in respect of root parameters, it was observed that, minimum days to rooting, maximum number of roots cutting^{-1}, length of main root, survival percentage of rooted cuttings, root volume, fresh weight of roots cutting^{-1} and dry weight of roots cutting^{-1} are recorded with T_{13} i.e. hardwood cutting and 2000 ppm IBA.

References

1. Asl MB, Somayeh S, Valipor V. Effects of Indole Acetic Acid on the rooting ability of semi-hardwood *Bougainvillea sp.* Cuttings. Mod Appl Sci 2012;6:121-23.
2. De Klerk GJ, Van Der Krieken WM, De Jong JC. The formation of adventitious roots; new concepts, new possibilities. *In vitro* Cell Dev. Biol 1999;35:189-199.
3. Deshmukh KK, Barad AV. Effect of growth regulators on rooting of stem cutting in Bougainvillea buttiana var. Mahara. Crop-Research 2006;32(3):167-169.
4. Gupta VN, Kher MA. A note on the effect of root promoting hormones on rooting of *Ixora coccinea* by tip cuttings under intermittent mist. Prog. Hort 1989;21(1&2):138-140.
5. Hamid Babaie, Hossein Zarei, Khodayar Hemmati. Propagation of *Ficus benjamina*var. Starlight by Stenting Technique under Different Concentrations of IBA in Various Times of Taking Cutting. J Orna. Plants 2014;4(2):75-79.
6. Karimiyan MA, Dahmardeh M, Khamari I. Improving the rooting capacity of stem cuttings of *Schefflera arboricola, Ficus benjamina* and *Syringa amurensis* by influenced different concentrations of Indole-3-Butyric Acid (IBA). International J Agri. and Forestry 2013;3(3):94-97.
7. Kirtikar KR, Basu BD. Indian Medicinal plants vol. II (second edition), Bishen Singh Mahendra Pal Singh, 23-A, New Connaught place, Dehradun 1984, P848-849.
8. Leaky RRB, Charman VR, Longman KA. Physiological studies for tree improvement and conservation. Factors affecting root initiation in cuttings of *Triplochiton scleroxylon* K. Schum. Forest Ecology and management 1984;4:53-66.
9. Maryam Shirzad, Shahram Sedaghathoor, Davood Hashemabadi. Effect of Media and Different Concentrations of IBA on Rooting of '*Ficus benjamina* L.' Cutting. J Orna and Hort. Plants 2012;2(1):61-64.
10. Mehraj H, Shiam IH, Taufique T, Shahrin S, Jamal Uddin AFM. Influence of Indole-3-Butyric Acid (IBA) on sprouting and rooting potential of *Bougainvillea spectabilis* cuttings. Bangladesh Res. Pub. J 2013;9(1):44-49.
11. Mohammed AAF, Hamid AEY. Vegetative propagation of *Peltophorium petrocarpum* (DC) Backer ex k. Heyne: A multi-purpose tree. Net journal of Agricultural scienc 2014;2(4):113-116.
12. Niaz A, Muhammad I, Gulam N. Influence of various concentration of IBA on different types of Bougainvillea glabra var. varigata cutting sharad J Agriculture 2002;18(3):263-270.
13. Nogueira AM, Chalfun NNJ, Dutraand LF, Villa F. Propagation of fig tree (*Ficus carica* L.) by cuttings obtained during vegetative period. Cienciae Agrotecnologia 2007;31(3):914-920.
14. Parminder S, Singh K. Effect of NAA and IBA on rooting of stem cutting in Bougainvillea cv. Cherry Blossom J Res. Punjab Agric. Univ. 2003;40(2):204-205.
15. Prabhakar Singh, Singh AK, Savita Thakur. Propagation of fig (*Ficus carica*) cv. Daulatabad through cuttings with aid of IBA under mist. Scientific Hort 2006;10:179-186.
16. Patel MJ, Dave SK. Effect of auxins on rooting of cuttings in ixora (*Ixora coccinea* L.). Presented in National seminar on Propagation and nursery management in horticulture, October 4&5, at B.A.C.A., Anand 1996, P29.
17. Ramesh Kumar. Effect of IBA on rooting of bougainvillea cuttings. Flor. Res. Trend in India, National Symposium on: Indian floricultire in the new millenium, LalBagh, Bangalore 2002, P351-352.
18. Sahariya, Kuldeep Sing JN, Singh A. Studied on the effect of IBA on rooting of bougainvillea (var. Thimma) cuttings in open field and polyhouse condition, Asian J Horti 2013;8(1):140-142.
19. Singh SP, Motial VS. Effect of intermittent mist and IBA on regeneration of *Jasminum sambac* cv. Madhanban by different types of cutting. Haryana J Hort. Sci 1981;10:54-57.
20. Sherer VK, Gadiev RS, Salun SI. Growth regulating activety of various chemical coumpounds of grapvine rootstock cutting. Vin.Org. Adarshalvai Vinodelie 1985;28:12-15.
21. Shiva KN, Nair SA. Effect of growing environment and rooting hormone on root and shoot characters of hibiscus. Indian J Hort 2008;66(2):233-238.
22. Thakor CM, Joshi KI, Patel NM, Joshi VI. Effect of growth regulators on rooting of stem cuttings of Ixora (*Ixora singaporensis*). Presented in National seminar on Propagation and nursery management in horticulture, October 4&5, at B.A.C.A., Anand 1996, P29.