International Journal of Environment, Agriculture and Biotechnology
Vol-10, Issue-3; May-Jun, 2025
Peer-Reviewed International Journal
Journal Home Page Available: https://ijeab.com/
Journal DOI: 10.22161/ijeab

Effect of Different Auxin Concentrations on Rooting of Bougainvillea

Babloo Maurya[1] and Navaldey Bharti[2*]

Department of Horticulture, Faculty of Agriculture, Kamla Nehru Institute of Physical and Social Sciences, (An Autonomous Institute), Faridipur, Sultanpur, Uttar Pradesh, India
*Corresponding Author: e-mail: navaldeysingh@gmail.com

Received: 15 Apr 2025; Received in revised form: 14 May 2025; Accepted: 17 May 2025; Available online: 24 May 2025
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Abstract— *The present study was conducted to evaluate the effect of different concentrations of Indole- 3 Butyric Acid (IBA) on the rooting and sprouting performance of Bougainvillea cuttings. The cuttings were treated with different IBA concentrations. The treatments were T_1 (Distilled water), T_2 (IBA 500 ppm), T_3 (IBA 1000 ppm), T_4 (IBA 1500 ppm), T_5 (IBA 2000 ppm), T_6 (IBA 2500 ppm), T_7 (IBA 3000 ppm), T_8 (IBA 3500 ppm) and T_9 (IBA 4000 ppm). Key parameters observed were days to sprouting, number of shoots per cutting, sprouting percentage, root length and number of roots per cutting. The results revealed that IBA significantly enhanced rooting and sprouting compared to untreated controls. Among all treatments T_6 (IBA 2500ppm) and T_5 (IBA 2000ppm) were found to be the most effective, resulting in earlier rooting, increased shoot formation, higher sprouting percentage, longer roots, and more roots per cutting. Higher concentrations above 3000 ppm showed reduced effectiveness, likely due to auxin toxicity. This study concludes that moderate IBA concentrations (2000–2500 ppm) are optimal for the successful propagation of bougainvillea through cuttings.*

Keywords— ***Bougainvillea, IBA, Rooting hormone, Vegetative Propagation, Root length.***

I. INTRODUCTION

Bougainvillea is a fast-growing, evergreen plant that grows like a vine in warm tropical and subtropical areas. It originally comes from parts of South America, from western Brazil to southern Argentina. It belongs to the Nyctaginaceae family and has about ten different species. The most commonly used ones in gardening are *B. spectabilis, B. glabra, and B. peruviana*. *B. peruviana* is a woody shrub can grow up to 12 meters tall, climbing or trailing with the help of stiff, thorny stems. Its leaves are simple and vary in shape, while its vibrant, petal-like bracts are a key ornamental feature, making it ideal for landscaping **Parmar (2010)**. Though, it produces seeds, bougainvillea is mainly propagated through vegetative methods such as cuttings, budding, layering, and inarching due to low seed viability **Ahmad *et al.* (2002)**. Like many perennials, it is commonly multiplied using parts like stems and roots in a warm and humid climatic condition. Plant grows and develops with the help of special chemicals called hormones. One important group of these hormones is auxins, which help with root growth, cell stretching, and overall plant development. The natural auxin called Indole-3-acetic acid (IAA) is common in plants, while synthetic versions like IBA and NAA are often used to improve plant growth, especially when growing new plants from cuttings. In North Central India a perennial shrub are generally propagated during monsoon in open condition or throughout the year under protected condition but this experiment was conducted to propagate the bougainvillea in open climate during spring season which is quite drier period as compared to monsoon using IBA. This research is particularly beneficial for commercial growers aiming to improve the efficiency and success rate of their propagation techniques in open climate during dry period.

II. MATERIAL AND METHODS

The experiment was conducted to assess effect of different auxin concentration on rooting of bougainvillea cv. Torch Glow at Horticulture Research Farm, Department of Horticulture at Kamla Nehru Institute of Physical and Social Sciences, Faridipur, Sultanpur, Uttar Pradesh, India, during February-March 2025, which is situated at about 8 km distance from district head quarter of Sultanpur in the North-East direction. The geographical situation of the farm lies at 26.30' North latitudes, 82.11' East longitude and at an altitude of 128.93' meters above the mean sea level. The hardwood cuttings of 15 cm length and pencil thickness was prepared in the month of February, and planted quick dip for 10 seconds in treatment with different concentrations of IBA (Indole- 3 butyric acid) was applied. The stock solution of 4000 ppm IBA was prepared by dissolving IBA 2g in 500ml distilled water and further concentrations was prepared by dilution of stock solution accordingly. IBA directly does not dissolve in distilled water so ethanol was used. The experiment was carried out by planting cuttings in plastic trays and filled with potting mixture which was prepared by well mixing one part of cocopeat, one part of sand and one part of vermicompost. The experiment was laid out in Completely Randomized Design with nine treatments which was replicated five times viz., T_1 (Distilled water), T_2 (IBA 500 ppm), T_3 (IBA 1000 ppm), T_4 (IBA 1500 ppm), T_5 (IBA 2000 ppm), T_6 (IBA 2500 ppm), T_7 (IBA 3000 ppm), T_8 (IBA 3500 ppm) and T_9 (IBA 4000 ppm).

III. RESULTS AND DISCUSSION

The study was conducted to evaluate how different levels of auxin (ranging from 500 ppm to 4000 ppm) influence the rooting ability of bougainvillea cuttings. The data recorded on days to sprouting, number of shoots per cutting, sprouting percentage, root length and number of roots per cutting are displayed in Table 1. The findings varied depending on the amount of auxin used. The minimum days to sprouting 08.20 days was observed in T_6 (IBA 2500ppm) which is at par with 08.40 days in T_5 (IBA 2000ppm). The maximum days to sprouting 14.20 days was noted in T_1 (Distilled water). The highest number of shoots per cutting 07.00 was observed in T_6 (IBA 2500ppm) followed by 05.60 in T_5 (IBA 2000ppm) whereas the minimum number of shoot per cutting 03.00 was found in T_1 (Distilled water). The data pertaining to sprouting percentage was affected by different auxin concentrations on rooting of bougainvillea. Results revealed that T_6 (IBA 2500ppm) exhibit maximum sprouting percentage 90.00% which is at par with 85.00% in T_5 (IBA 2000ppm). The minimum sprouting percentage 50.00% was found in T_1 (Distilled water). The maximum root length 10.50 cm was noted in T_6 (IBA 2500 ppm) followed by 07.36 cm in T_5 (IBA 2000 ppm). The minimum root length 02.66 cm was observed in T_1 (Distilled water). Similarly, maximum number of roots per cutting 36.00 was recorded in T_6 (IBA 2500ppm) which is at par with 22.50 in T_5 (IBA 2000ppm). The minimum number of roots per cutting 10.50 was found in T_1 (Distilled water). Hardwood cuttings of *Bougainvillea* cv. Mary Palmer achieved 75% rooting when treated with 1500 ppm IBA, compared to only 15% in the control, as reported by **Kale and Bhujbal (1972) and Ramdayal *et al.* (2001). Gandotra *et al.*(1975)** observed that some success has been achieved in rooting of stem cuttings in Bougainvillea with the use of synthetic auxins, especially indole- 3- butyric acid. **Panwar *et al.*(1994)** observed the best rooting in hard wood cuttings of Bougainvillea treated with IBA 2000 ppm. Overall, the findings confirm that auxin significantly affects the rooting and growth of Bougainvillea cuttings. However, its impact is highly dependent on the concentration used. Auxin levels of 2000 ppm and 2500 ppm were most effective, promoting faster sprouting, more shoots, and stronger root development, making them ideal for successful propagation of Bougainvillea. **Kanamadi *et al.* (1997)** reported that the treatment with GA at 100ppm + IBA at 2500ppm + NAA at 2500 ppm resulted in the maximum number of leaves and length of the longest shoot per cutting in Bougainvillea.

Table-1 Effect of different auxin concentrations on rooting of bougainvillea

Treatments	Treatment details	Days to Sprouting	Number of Shoots Per Cutting	Sprouting Percentage	Root Length (cm)	Number of Roots Per Cutting
T_1	**No Treatment**	14.20	03.00	50.00	02.66	10.50
T_2	**IBA 500 ppm**	12.60	03.40	65.00	02.80	14.75
T_3	**IBA 1000 ppm**	11.00	03.80	65.00	02.76	16.75
T_4	**IBA 1500 ppm**	10.20	04.40	70.00	04.38	21.75
T_5	**IBA 2000 ppm**	08.40	05.60	85.00	07.36	22.50

T_6	**IBA 2500 ppm**	08.20	07.00	90.00	10.50	36.00
T_7	**IBA 3000 ppm**	10.60	05.00	65.00	06.44	19.75
T_8	**IBA 3500 ppm**	11.00	04.40	55.00	05.34	17.00
T_9	**IBA 4000 ppm**	13.00	03.00	60.00	04.48	19.75
C.D		00.88	NS	NS	00.43	01.58
SE (m)		00.30	00.89	15.23	00.15	00.54
SE(d)		00.40	01.27	21.53	00.21	00.76
C.V		06.18	45.70	50.66	06.51	05.47

IV. CONCLUSION

The study clearly demonstrated that the application of IBA significantly influences the rooting and sprouting performance of bougainvillea cuttings. Out of all the concentrations tested, IBA at 2000 ppm and 2500 ppm showed the best results. These concentrations resulted in the shortest time to rooting and sprouting, higher sprouting percentages, greater number of shoots and roots per cutting, longer root lengths.

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