ISSN Print: 2664-844X
ISSN Online: 2664-8458
NAAS Rating (2025): 4.97
IJAFS 2025; 7(9): 606-608
www.agriculturaljournals.com
Received: 19-06-2025
Accepted: 21-07-2025

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Effect of different potting media and biostimulants on growth and survival percentage of bougainvillea (*Bougainvillea* spp.) cuttings

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DOI: https://www.doi.org/10.33545/2664844X.2025.v7.i9h.798

Abstract
The current study focused on effect of different potting media and biostimulants on growth and survival percentage of bougainvillea (*Bougainvillea* spp.) cuttings. The research was conducted at the Hi-tech unit of the College of Horticulture, Dapoli, under the auspices of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri, Maharashtra, utilizing a Factorial Randomized Block Design (FRBD) within a partially protected environment, specifically a green shade net house, with three replications and fifteen treatment combinations. The investigation involved five different potting medias viz. (M_0) Soil + FYM (control) (3:1), (M_1) Soil + Sand + Vermicompost (1:1:1), (M_2) Soil + Cocopeat + Vermicompost (1:1:1), (M_3) Soil + Cocopeat + Rice husk (1:1:1) and (M_4) Soil + Vermicompost + Rice husk (1:1:1) alongside three biostimulants (B_0) (IBA (0.5%) Control, (B_1) Humic acid (0.3%) and (B_2) Chitosan (0.01%). Findings revealed that combination M_2B_0 (Soil + Cocopeat + Vermicompost (1:1:1) combined with IBA @ 0.5%) significantly improved plant height (42.35 cm), stem girth (13.29 mm), Number of shoots (4.47), number of leaves (45.67) and leaf area (32.86 cm^2). The highest survival percentage (74.77) was also recorded in combination M_2B_0.

Keywords: Bougainvillea, potting media, biostimulants

Introduction
Bougainvillea is a group of thorny ornamental plants that includes vines, shrubs, and trees, known for their colourful, petal like bracts that surround small flowers. Originally from South America particularly Brazil, Peru, and Argentina, bougainvillea is admired for its vivid hues and resilience. The plant was first recorded by French botanist Philibert Commerson during a global voyage with explorer Louis Antoine de Bougainville, after whom it was named. Over time, Bougainvillea has become a popular choice for ornamental gardening in tropical and subtropical areas around the world. Its striking appearance, along with its ability to flourish in tough conditions and poor soil, has made it a favorite in landscaping.

By using an alternative growing medium composed of materials like cocopeat, vermicompost, farmyard manure, sand, and similar organic or inert components can provide a much more favorable environment for plant development. Such a mix typically maintains a light and loose structure, preventing compaction and thereby supporting better water retention, adequate drainage, sufficient aeration, and easier root expansion. Effective propagation strategies can significantly increase plant production, boost nursery profitability and improve overall productivity and resource management.

Materials and methods
The current study was conducted during the December 2024 to April 2025 at the Hi-tech unit of College of Horticulture, Dapoli, Dist. Ratnagiri in Maharashtra. Throughout the experimental duration, meteorological data was collected. The experiment was carried out in Factorial Randomized Block Design. There were two factors viz. potting media Soil + FYM (control) (3:1), Soil + Sand + Vermicompost (1:1:1), Soil + Cocopeat + Vermicompost (1:1:1), Soil + Cocopeat + Rice husk (1:1:1) and Soil + Vermicompost + Rice husk (1:1:1) and three biostimulants (IBA (0.5%) Control, Humic acid (0.3%) and Chitosan (0.01%).

The media for planting was prepared by mixing the soil, FYM, cocopeat, sand, vermicompost and rice husk as per the requirement of the respective treatment. During the preparation of propagation medium, Trichoderma at the rate 10g per 100 kg was well mixed in a media to avoid fungal growth in the polybags. The planting material was obtained from old uniformly green shrubs of Bougainvillea. To protect the axillary buds, the leaves were carefully pruned from the shoots. By giving a slanting cut on the lower end, the cuttings were prepared to distinguish both ends when planting. For preparing stock solution of IBA *viz.*,0.5%, IBA @ 5 g were weighed and dissolved separately in 20 ml of Ethyl alcohol. After completely dissolving the hormone and getting transparent solution, volume was made up to 1000 ml (1 L) by adding distilled water. For preparing solutions of different concentrations of humic acid and chitosan *viz.*,0.3 and 0.01% @ 3g and 0.1 g respectively were weighed and dissolved separately in 1000 ml (1 L). After completely dissolving the hormone basal portion of cuttings about 2 cm length with last node was dipped for 10 minutes in respective solution and then planted in polythene bags of size 6 by 8 prepared media The study examined the interaction effects of both factors, focusing on plant height, stem girth, number of shoots, number of leaves, leaf area and survival percentage, which were recorded at the end of the experiment, 120 days post-planting. The collected data were analyzed using the standard analysis of variance method as outlined by Panse and Sukhatme (1995) [6].

Results and Discussion

Plant height (cm)

The highest plant height (42.35 cm) (Table 1) was recorded in M_2B_0 (Soil + Cocopeat + Vermicompost (1:1:1) combined with 0.5% IBA) and statistically at par (40.41 cm) with M_3B_0 (Soil + Cocopeat + Rice husk (1:1:1) combined with 0.5% IBA) whereas, the lowest plant height (30.49 cm) was recorded in M_4B_1 (Soil + Vermicompost + Rice husk (1:1:1) combined with 0.5% IBA). Plant height is considered one of the most important morphological parameters in plant growth studies. In the present investigation, it was observed that different growing media and biostimulants had a significant influence on the height of cuttings. Among the tested media, the combination of cocopeat and vermicompost resulted in the greatest plant height. This effect might be attributed to the beneficial roles of cocopeat and vermicompost in enhancing the physical and chemical properties of the rooting medium. These components improved water retention, aeration, organic matter mineralization, nutrient solubilization, and micronutrient availability, while also facilitating gaseous exchange between the roots and the atmosphere. Such improvements in the rooting environment likely contributed to enhanced shoot elongation and overall growth of the cuttings. Similar findings were reported by Phule *et al.* (2024) [7] in bougainvillea.

Stem girth (mm)

At 120 days after planting, statistically maximum stem girth (13.29 mm) (Table 1) was found in M_2B_0 which is statistically at par (12.17 mm) in M_2B_1. The minimum stem girth (10.73 mm) was noticed in treatment M_2B_2. This could be due to Soil, Cocopeat and Vermicompost provides an ideal physical and nutritional environment, while IBA enhances root initiation and function. Together, they create optimal conditions for increased stem girth through improved vascular development, cellular activity, and overall plant vigour. Similar findings were observed by Phule *et al*. (2024) [7] in bougainvillea.

Table 1: Effect of different potting media and biostimulants on growth and survival percentage of bougainvillea (*Bougainvillea* spp.) cuttings at 120 days after planting.

Treatments	Plant height (cm)	Stem girth (mm)	Number of shoots	Number of leaves	Leaf area (cm^2)	Survival percentage
M_0B_0	39.11	11.56	3.21	42.26	20.91	64.23
M_0B_1	37.88	11.11	3.88	39.35	19.91	63.46
M_0B_2	35.97	11.53	3.38	27.17	19.54	60.57
M_1B_0	39.99	11.52	3.73	42.97	27.50	69.23
M_1B_1	39.01	11.12	3.48	25.68	22.68	65.23
M_1B_2	37.62	10.98	3.70	24.55	23.40	55.68
M_2B_0	42.35	13.29	4.47	45.67	32.86	74.77
M_2B_1	39.50	12.17	4.45	45.66	31.44	73.56
M_2B_2	38.99	10.73	3.27	38.16	25.32	47.98
M_3B_0	40.41	11.61	3.93	37.77	31.12	54.06
M_3B_1	40.18	11.23	4.00	43.35	29.79	53.05
M_3B_2	39.21	11.13	3.95	40.34	22.23	70.59
M_4B_0	39.10	11.12	3.94	40.55	31.04	61.60
M_4B_1	30.49	11.34	3.42	21.87	28.59	54.16
M_4B_2	37.35	11.45	3.24	32.61	24.05	63.66
S.Em.(±)	0.50	0.09	0.01	0.31	0.23	0.12
C.D. @ 5%	2.10	0.37	0.05	1.22	0.93	0.47
Result	SIG	SIG	SIG	SIG	SIG	SIG

Factor A: Potting media Factor

- M_0: Soil + FYM (control) (3:1)
- M_1: Soil + Sand + Vermicompost (1:1:1)
- M_2: Soil + Cocopeat + Vermicompost (1:1:1)
- M_3: Soil + Cocopeat + Rice husk (1:1:1)
- M_4: Soil + Vermicompost + Rice husk (1:1:1)

B: Biostimulants

- B_0: IBA (0.5%) Control
- B_1: Humic acid (0.3%)
- B_2: Chitosan (0.01%)

Number of shoots

The interaction effect of potting media and biostimulants was found significant in bougainvillea cuttings. With respect to no. of shoots, highest no of shoots (4.47) (Table 1) and lowest (3.21) were obtained in M_2B_0 and M_0B_0 respectively at 120 days after planting. It could be due to IBA is primarily known for rooting, stronger root systems often correlate with better shoot emergence and overall plant vigour, especially in cuttings.

Number of leaves

Statistically maximum number of leaves (45.67) (Table 1) were observed in combination M_2B_0 which is at par (45.66) with M_2B_1 while the lowest number of leaves (21.87) were recorded in treatment M_4B_1. Plants can support more leaves might be due to the roots can deliver enough water and nutrients, and the shoot system is hormonally and nutritionally primed for growth.

Leaf area (cm^2)

At 120 days after planting, there was significant difference among the combination of potting media and biostimulants. The maximum leaf area (32.86 cm^2) (Table 1) was observed in combination M_2B_0. while the minimum leaf area (19.54 cm^2) was recorded in treatment M_0B_2. This was might be due to the combination promotes strong root development and provides balanced nutrients, moisture, and aeration. This enhances water and nutrient uptake, boosting shoot growth and leaf expansion.

Survival percentage

The interaction effect of potting media and biostimulants was found significant in survival percentage. However, the results revealed that statistically maximum survival percentage (74.77) (Table 1) were recorded in M_2B_0 which was statistically at par (73.56) with M_2B_1 and minimum (47.98) in M_2B_2 at final stage. Same results were also obtained by Darekar *et al.* (2024) [1] in crossandra, Naggar and Esmaiel (2022) [3] in *Dracaena marginata* cuttings.

Conclusion

From the present investigation, it can be concluded that, the different potting media and biostimulants was found insightful with respect to various growth and survival characters of bougainvillea. In potting media treatment, Soil + Cocopeat + Vermicompost (1:1:1) was found best with respect to, survival and successive growth of cutting. In biostimulants treatment, (IBA 0.5%) was found best with respect to vegetative growth and survival rates. The potting media, Soil + Cocopeat + Vermicompost (1:1:1) with (IBA 0.5% can be considered as the best treatment combination for multiplication of bougainvillea.

However, this investigation on the present investigation entitled “Effect of different potting media and biostimulants on growth and survival percentage of bougainvillea (*Bougainvillea* spp.) cuttings” is carried out for only one season and hence for confirmation of these results the experimentation for the next years is necessary at different location to assess stability.

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