Response of different bougainvillea varieties to cutting propagation

Abstract

The present investigation on "Response of different bougainvillea varieties to cutting propagation" conducted during 2023-2024. The experiment was carried out in factorial randomized block design with three replications. There were two factors viz. nine varieties of bougainvillea (Golden Blow, Pink Beauty, Blondie, Mr. Odicee, Singapore Red, Filoman, Rose Vellis Delight, M.P.S. and Dr. Bhabha) and three type of cutting (softwood, semi hardwood and hardwood cutting). Among the various interactions, hardwood cuttings of varieties Singapore red and Blondie performed better with respect to survival (75.55% and 73.33% respectively) and some growth parameters as compared to others. Variety M.P.S. recorded better survival percentage in all three types of cutting (softwood, semi hardwood and hardwood) which was followed by Blondie and Filoman.

Keywords: Bougainvillea, varieties, types of cutting, propagation.

Introduction

Bougainvillea *(Bougainvillea spp.*) is a tropical and subtropical plant. It is originally of the family Nyctaginaceae, possesses high ornamental value in horticulture Zhang et al. [13]. The usage of bougainvillea has been increased due to modernization and urbanization since landscape horticulture is being popular round the globe and demand of vast production is raising in urban areas. It is tolerant to drought and pollution thus minimal care is required in comparison to other plants, and contains multiple uses Singh et al. [11] It has a wide range of varieties, each with unique growth characteristics and propagation needs.

Different cultivars exhibited distinct patterns in growth rate, flowering time and flower colours. Some cultivars showed superior adaptability to the tropical climate, with better flowering performance and growth characteristics Vachhranjani and Deshmukh [12]. Propagating bougainvillea through cuttings can be a sustainable practice, as it allows grower to produce new plants without depleting wild populations or relying on seed collection. By utilizing different types of cuttings, one can take the advantage of various stages of plant's growth, ensuring that making the most out of the entire plant. Different varieties may exhibit distinct traits such as flower colour, growth habit, etc. Understanding these traits helps grower to select varieties that are best to meet their needs and preferences. Also, propagation of such varieties helps to maintain the genetic characteristics of the parent plant, ensuring that the new plants are true to type. Efficient propagation methods and successful rooting across multiple varieties can lead to higher total number of plants produced. This increases overall plant output and improve the profitability of nursery. Overall, research in this area helps to enhance productivity, cost effectiveness and resource optimization.

This study aims to examine which type of cutting is suitable for successful rooting and survival in different varieties of bougainvillea. Not only hardwood cuttings but also semi hardwood and softwood cuttings will significantly influence the growth rate, rooting success and overall plant health of bougainvillea varieties. This approach ensures a more efficient use of the plant material and reduces the need for a larger number of mother plants, which can be beneficial in terms of both resource management and economic efficiency.

Material and methods

The present study was conducted during December 2023 to May 2024 at the Hi-tech unit of College of Horticulture, Dapoli, Dist. Ratnagiri in Maharashtra. Meteorological data was collected continuously throughout the experiment. The experiment was carried out in Factorial Randomized Block Design.

There were two factors viz. nine varieties of bougainvillea Golden Blow (V_1), Pink Beauty (V_2), Blondie (V_3), Mr. Odicee (V_4), Singapore Red (V_5), Filoman (V_6), Rose Vellis Delight (V_7), M.P.S. (V_8) and Dr. Bhabha (V_9) and three types of cutting, hardwood, semi hardwood and softwood cutting. Fifteen cutting per treatment were planted in polybags with three replications. Potting mixture were prepared with Soil: FYM in 3:1 ratio. Polythene bags of 4"×6" cm size was used. Cuttings were collected from mother plants as per the varieties available at hi-tech unit of College of Horticulture, Dapoli. Cuttings were collected by keeping three to four nodes and giving the slanting cut at basal end leaving 2 cm portion just below the node. Slanting cut were given with secateur. Leavers were removed completely. After separating from mother plants, cuttings were kept in moist gunny bags or clothes to avoid the drying of shoot. Basal end surface of cuttings was treated with keradix to enhance rooting. Cuttings of nine varieties of bougainvillea were planted in polybags. Polybags were watered before

planting to moist the soil. Irrigation was done as per the requirement and to maintain humidity at early stage. Hand weeding was carried out at 15 days interval or as per the need.

The observation viz., days required for sprouting, sprouting percentage, survival percentage, plant height, stem girth, number of shoots, number of leaves, length if root and number of roots were recorded at 180 days after planting except days required for sprouting and sprouting percentage. The data on individual characters underwent analysis of variance, a widely used method in Factorial Randomized Block Design, as described by Panse and Sukhatme [7].

Result and Discussion

Survival percentage

The maximum survival percentage (75.55) was observed in treatment combination V_5T_3 (variety Singapore red propagated by hardwood cutting) whereas softwood cuttings of varieties V_1 (Golden blow), V_2 (Pink beauty), V_4 (Mr. Odicee), V_5 (Singapore red), V_7 (Rose vellis delight) and V_9 (Dr. Bhabha) were sprouted; but not survived. Hence, the considerably lower value has taken as a minimum survival percentage. So that, minimum survival percentage (35.55) was recorded in V_3T_1 (variety Blondie propagated by softwood cutting), V_6T_1 (variety Filoman propagated by softwood cutting), V_7T_2 (variety Rose vellis delight propagated by semi hardwood cutting) and V_9T_2 (variety Dr. Bhabha propagated by semi hardwood cutting). Certain varieties may have traits that make them more resilient. Some varieties may survive better from softwood cuttings while other might be more successful with semi hardwood and hardwood cuttings. Generally, semi hardwood and hardwood cuttings are preferred due to their balance of maturity and rooting capability, leading to higher survival rates. A similar result was reported by Mishra [5] in bougainvillea varieties and by Patil [9] in three species of jasmine propagated by two types of cuttings.

Shoot parameters

The wide variation is often seen in different cultivars of the same species of bougainvillea for rooting, sprouting and growth traits Memon et al. [4]. Across the various interactions, no plant height, stem girth, number of shoots and number of leaves were recorded for softwood cuttings of varieties V_1 (Golden blow), V_2 (Pink beauty), V_4 (Mr. Odicee), V_5 (Singapore red), V_7 (Rose vellis delight) and V_9 (Dr. Bhabha) as they did not survive. Hence, considerably lower values have taken as a minimum observation. V_5T_3 (variety Singapore red propagated by hardwood cutting) recorded the highest plant height (56.21 cm) and stem girth (6.98 mm) while lowest plant height (27.97 cm) and stem girth (3.68 mm) were recorded in V_9T_2 (variety Dr. Bhabha propagated by semi hardwood cutting) at 180 days after planting. V_2T_3 (variety Pink Beauty propagated by hardwood cutting) recorded highest number

of shoots (4.53) and number of leaves (57.33) whereas V_9T_2 (variety Dr. Bhabha propagated by semi hardwood cutting) recorded lowest number of shoots and V_4T_2 (variety Mr. Odicee propagated by semi hardwood cutting) recorded lowest number of leaves at 180 days after planting. While hardwood cuttings are generally favoured due to their balance of rooting capability and maturity, the optimal cutting type may vary based on the specific variety of bougainvillea. Difference in vegetative growth characters of different cultivars may be due to varied growth rate and their genetic make ups as a result, variation in phenotypic expression is expected to occur Sharma [10]. As hardwood cuttings have accumulated significant energy reserves in the form of carbohydrates and other nutrients which provide required resources, multiple shoot growth is initiated and sustained Similar variation in number of leaves were given by Panwar [8] in bougainvillea varieties and Chaudhary [1] in kiwifruit.

Root parameters

Root development is a prime stage in vegetative propagation of wood or horticultural plants, and rooting problems will lead to significant economic losses Mohammed and Hamid [6]. The interaction effects between the varieties of bougainvillea and types of cutting were significant for root length and number of roots. As mentioned earlier regarding zero survival of softwood cuttings of varieties V_1 (Golden blow), V_2 (Pink beauty), V_4 (Mr. Odicee), V_5 (Singapore red), V_7 (Rose vellis delight) and V_9 (Dr. Bhabha). V_5T_3 (variety Singapore Red propagated by hardwood cutting) recorded longest root (13.72 cm) and V_3T_3 (variety Blondie propagated by hardwood cutting) recorded maximum number of roots (35.89). The response of rooting can differ with variety, physiological stage of the parent plant, time of plantation of the cutting, environmental element of propagation chamber. Hartmann et al. [2]. Carbohydrates accumulation was found in the base of cuttings and this allows it to be the only part with the ability to grow roots, especially due to the presence of high C/N ratio required for easier and faster root formation Herastuti and Hardiastuti [3]. The results align closely with findings reported by Panwar [8] in bougainvillea and Chaudhary [1] in kiwi fruit.

Table 1. **Effect of types of cutting on survival percentage among different varieties of bougainvillea at 180 days after planting.**

Treatments	Survival percentage
V_1T_1	0.00
V_1T_2	53.33
V_1T_3	57.77
V_2T_1	0.00
V_2T_2	62.22
V_2T_3	71.11
V_3T_1	35.55
V_3T_2	57.78
V_3T_3	73.33

V_4T_1	0.00
V_4T_2	40.00
V_4T_3	53.33
V_5T_1	0.00
V_5T_2	66.66
V_5T_3	**75.55**
V_6T_1	35.55
V_6T_2	46.66
V_6T_3	57.77
V_7T_1	0.00
V_7T_2	35.55
V_7T_3	55.55
V_8T_1	46.66
V_8T_2	57.77
V_8T_3	71.11
V_9T_1	0.00
V_9T_2	35.55
V_9T_3	37.78
S.Em. (±)	3.65
C.D. @ 5%	10.36
Result	**SIG**

Table 2. **Effect of types of cutting on shoot parameters among different varieties of bougainvillea at 180 days after planting.**

Treatments	**Shoot parameters**			
	Plant height (cm)	**Stem girth (mm)**	**Number of shoots**	**Number of leaves**
V_1T_1	0.00	0.00	0.00	0.00
V_1T_2	48.41	4.88	2.80	36.53
V_1T_3	50.79	6.10	3.27	39.73
V_2T_1	0.00	0.00	0.00	0.00
V_2T_2	31.63	4.36	4.47	55.93
V_2T_3	33.45	5.51	**4.53**	**57.33**
V_3T_1	46.13	3.18	2.60	29.40
V_3T_2	53.93	5.55	2.87	36.33
V_3T_3	49.89	6.75	3.27	40.60
V_4T_1	0.00	0.00	0.00	0.00
V_4T_2	28.81	3.90	2.73	18.47
V_4T_3	31.24	4.82	3.13	19.27
V_5T_1	0.00	0.00	0.00	0.00
V_5T_2	48.74	6.51	3.20	37.73
V_5T_3	**56.21**	**6.98**	3.47	41.20
V_6T_1	43.67	3.63	3.07	34.07
V_6T_2	48.61	5.39	3.20	36.07
V_6T_3	53.76	6.11	3.47	39.07
V_7T_1	0.00	0.00	0.00	0.00
V_7T_2	31.58	3.91	2.73	21.13
V_7T_3	32.87	4.15	3.00	22.13
V_8T_1	30.83	4.95	3.00	28.20

V_8T_2	32.80	5.75	3.33	28.40
V_8T_3	34.73	6.88	3.80	32.93
V_9T_1	0.00	0.00	0.00	0.00
V_9T_2	27.97	3.68	2.40	20.80
V_9T_3	28.41	4.29	3.07	21.73
S.Em. (±)	0.63	0.06	0.09	0.62
C.D. @ 5%	1.79	0.17	0.26	1.75
Result	**SIG**	**SIG**	**SIG**	**SIG**

Table 3. **Effect of types of cutting on root parameters among different varieties of bougainvillea at 180 days after planting.**

Treatments	**Root parameters**	
	Length of root (cm)	**Number of roots**
V_1T_1	0.00	0.00
V_1T_2	10.41	23.89
V_1T_3	10.72	30.89
V_2T_1	0.00	0.00
V_2T_2	10.22	17.44
V_2T_3	10.72	23.22
V_3T_1	11.69	17.67
V_3T_2	11.87	29.67
V_3T_3	12.24	**35.89**
V_4T_1	0.00	0.00
V_4T_2	9.93	16.56
V_4T_3	10.59	21.56
V_5T_1	0.00	0.00
V_5T_2	11.83	18.89
V_5T_3	**13.72**	23.00
V_6T_1	9.18	18.00
V_6T_2	10.35	22.89
V_6T_3	11.98	32.33
V_7T_1	0.00	0.00
V_7T_2	9.72	20.67
V_7T_3	11.20	26.00
V_8T_1	10.48	21.00
V_8T_2	10.53	28.67
V_8T_3	11.86	32.66
V_9T_1	0.00	0.00
V_9T_2	9.90	19.89
V_9T_3	10.11	22.33
S.Em. (±)	0.55	2.26
C.D. @ 5%	1.57	6.41
Result	**SIG**	**SIG**

Conclusion

From the present investigation, it could be concluded that type of cuttings had shown significant effect in different bougainvillea varieties. Hardwood cuttings of varieties Singapore red and Blondie performed better with respect to survival, shoot and root parameters. However, the results of the present investigation are based on a single season experiment and requires further more validation by conducting multilocational trials for two years on similar aspects for recommendation to ornamental nursery growers.

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