Root Parameter Investigation in Standardized Media for Bougainvillea (Bougainvillea comm. Ex Juss.) Propagation

ABSTRACT :
The study was conducted in Completely Randomized Design (CRD) with 16 treatments and 5 replications comprising of soilless media and biofertilizer Azotobacter.The present experiment entitled "Standardization of media for propagation of Bougainvillea (Bougainvillea comm. Ex Juss.)" was carried out at Horticultural nursery, College of Agriculture, IGKV, Raipur, (C.G) during the year 2019-20. All of the media treatments compared to the control had better vegetative and rooting qualities. Soil + Sand + Cocopeat had the highest sprouting rate and survival percentage of all the media treatments tested. All other Root attributes viz. The minimum days to rooting (144.80), The longest root length (6.08), highest number of roots per cutting (63.54). The most cuttings that could successfully take root (24.00) were found to be idealistic in media including soil, sand, and cocopeat. The results showed that all increasing media treatments had a substantial impact on all variables related to Bougainvillea development, including shoot and root growth. The results showed that the development of Bougainvillea as well as all the growing media treatments had a significant impact on all the characters' associated root growth. The maximum overall production cost has been seen in T6 (Soil + Sand + Cocopeat) and the least production cost in T13 (Soil + Azotobacter). Combination of rooting media has been beneficial to significantly increase the vegetative growth parameters and economics as compared to control in Bougainvillea.

Keywords : *Azotobacter*, cocopeat, Bougainvillea.

INTRODUCTION

Bougainvillea is a genus of thorny ornamental vines, bushes, and trees belonging to the four o' clock family, Nyctaginaceae. This evergreen shrub has a variety of flower colours like Red, Orange, Pink, Purple, White etc. It is mainly grown in open field condition. They flower most heavily in winter and early spring, but some plants put forth scattered clusters all year. Depending on the variety, it can be grown as a bush, hedge, in pots, as a bonsai, as standard or semi standard shrub or can be trained in pergola or arches.

Likewise, other ornamental plants, the multiplication of Bougainvillea is done by using vegetative part *i.e*. Stem cutting, Layering, Budding. Stem cutting is regarded as the cheapest and easiest method of Bougainvillea; however the success rate of propagation is very limited. Rooting percentage or else we can say rooting responses varies from variety to variety. As we know, in most of ornamental plants, the success of rooting in cuttings is mainly depends upon variety, time of planting and use of growth regulators (Rowezak, 2001)[6]. Rainy season is the best time for planting Bougainvillea.

"Use of different types of rooting media having different characteristics is important for quality rooting in cuttings. Though there is no universal rooting mix, different medias are used according to cutting types,different seasons etc" [9, 10]. Highest rooting percentage (> 97%) was seen with basal stem cutting compared with terminal and middle cutting. Highest number of roots/cuttings (27.66) was seen with basal stem cuttings after 60 days of planting the cuttings. Highest plant height(67.66 cm) and number of leaves/cutting (46.00) was seen with soil+sand (1:1) after 90 days of planting the cuttings (Eed *et al*. 2015)[3].

We are aware of the fact that, success rate of bougainvillea is very limited. Hence, to improve rooting in cuttings, several rooting hormones are widely used during propagation. The .The variety 'Mahara' is easily rooted with the help of auxin treatment. Growth hormones which are used are indole -3-butyric acid (IBA), 1-naphthalene acetic acid (NAA), indole -3-acetic acid (IAA). These hormones with different concentrations enhance the growth and development of roots.

MATERIAL AND METHODS

The field experiment was performed during the year 2019-2020 at the Horticulture research cum Instructional Farm, College of Agriculture, IGKV, Raipur (C.G).

Table 1 : Treatment Details: [12]

S.no	Treatments	Treatment details

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1.	T_1	Sand
2.	T_2	Cocopeat
3.	T_3	Rice husk
4.	T_4	Sawdust
5.	T_5	Soil + FYM + Sawdust
6.	T_6	Soil + Sand + Cocopeat
7.	T_7	Sand + FYM
8.	T_8	Sand + Azotobacter
9.	T_9	Soil + Cocopeat
10.	T_{10}	Soil + Sand + Ricehusk
11.	T_{11}	Soil + Sand
12.	T_{12}	Cocopeat + Azotobactor
13.	T_{13}	Soil + Azotobactor
14.	T_{14}	Ricehusk + Azotobactor
15.	T_{15}	Sawdust + Azotobactor
16.	T_{16}	Soil (control)

"After cutting from the mother plants, the hardwood cuttings (10-15 cm) of pencil thickness were prepared. The leaves were carefully trimmed from the shoots to prevent damage to the axiliary buds. The cuttings were prepared to differentiate both ends during planting by giving a slanting cut on the upper end and a straight cut on the lower end. The cuttings were planted immediately in media mixtures after quick dip treatment of IBA@ 4000 ppm for (<5 sec.) directly in the polythene bags.
1g of IBA was first dissolved in a few drops of 0.1N NaOH for 4000 ppm of IBA solution and then up to 250 ml of distilled water was make up in order to achieve the right concentration of IBA.
In the polybags with pre-punched bottom holes for drainage, various treatments containing different media were filled in. Various intercultural operations were carried out when needed. Various shoot and root attributes were noted and Statistically evaluated using Anova for Completely Randomized Design (CRD)". [12]

RESULT AND DISCUSSION

The minimum days to rooting (144.80) was recorded with T6 (Soil + Sand + Cocopeat). Likewise, the maximum days to rooting (152.40) was recorded with control T16 (Soil). this can be because of cocopeat, which has low nitrogen, calcium and magnesium but it is high in phosphorus and potassium (Gohil *et al.* 2018)[4] in ornamental pot plants. Benefits of phosphorus in plants is that, it is good for the root growth and development.
The longest root length (6.08) was observed in T6 (Soil +Sand + Cocopeat). The least root length (3.60) was observed in T15 (Sawdust + *Azotobacter*) at 180 DAP.
"The increase in the length of the cutting roots treated with growth regulators may be due to the accumulation of metabolism at the site of auxin application, cell enlargement, increased carbohydrate hydrolysis, new protein synthesis and auxin-induced cell division" [11]. The standard concentration of IBA combined with media increases the duration of the roots of bougainvillaea, an effect recorded by Eed *et al.* (2015)[3].
Data recorded at 180 DAP, treatment T6 (Soil + Sand + Cocopeat) showed highest number of roots per cutting (63.54). The lowest number of roots (39.78) was recorded with control T16 (Soil). These findings are in agreement with the reports of Nazari *et al.* (2011)[5] in hyacinth.
The maximum number of cutting attained rooting (24.00) was recorded in T6 (Soil + Sand + Cocopeat). The minimum number of cutting attained rooting (17.00) was recorded in Control T16 (Soil). Highest survival percentage was also found in T_6. This may be attributed to metabolite aggregation at the site of auxin application [7], accelerated carbohydrate hydrolysis, new protein synthesis, auxin-induced cell elongation and cell division [8]. Increases in the rooting percentage may be attributable to proper IBA concentration, high carbohydrates in turn, and low nitrogen levels contribute to further root forming (Carlson, 1929)[2].

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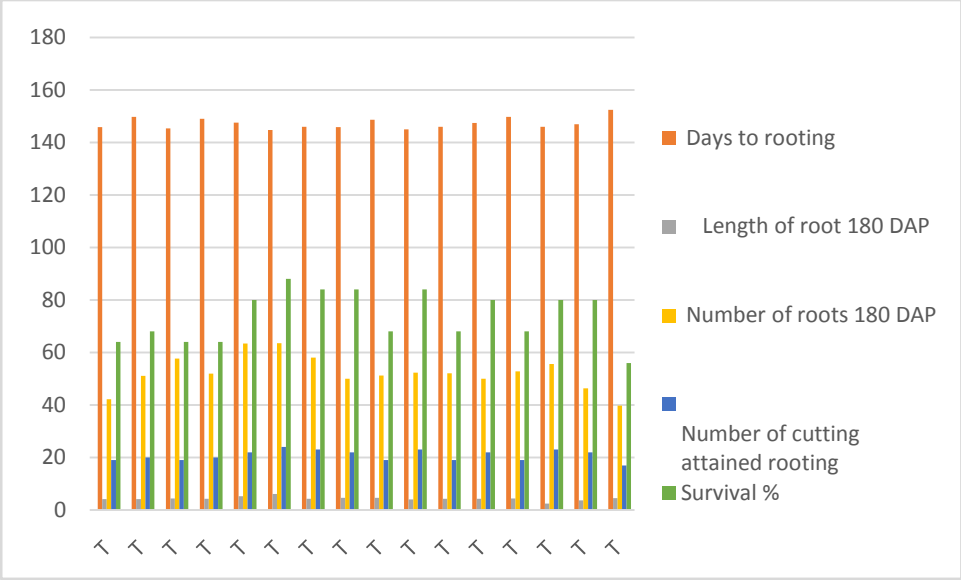

Fig 1. Graphical representation of effect of growing media on Bougainvillea (Root parameters)

Table 2. Effect of growing media on Bougainvillea

Tr. No.	Treatments	Days to rooting	Length of root 180 DAP	Number of roots 180 DAP
T1	Sand	145.80	4.14	42.24
T2	Cocopeat	149.80	4.18	51.04
T3	Ricehusk	145.40	4.42	57.73
T4	Sawdust	149.00	4.32	51.92
T5	Soil + FYM + Sawdust	147.60	5.24	63.36
T6	Soil + Sand + Cocopeat	144.80	6.08	63.54
T7	Sand + FYM	146.00	4.24	58.08
T8	Sand + *Azotobacter*	145.80	4.58	49.98
T9	Soil + Cocopeat	148.60	4.58	51.22
T10	Soil + Sand + Ricehusk	145.00	4.02	52.27
T11	Soil + Sand	146.00	4.26	52.10
T12	Cocopeat + *Azotobacter*	147.40	4.30	49.98
T13	Soil + *Azotobacter*	149.80	4.42	52.80
T14	Ricehusk + *Azotobacter*	146.00	2.40	55.62
T15	Sawdust + *Azotobacter*	147.00	3.60	46.29
T16	Soil (control)	152.40	4.54	39.78
	SEm ±	1.55	0.30	3.48
	C.D @ 5%	4.38	0.87	9.82

Table 3. Effect of growing media on Bougainvillea

Tr. No.	Treatments	Number of cutting attained rooting	Survival %
T1	Sand	19	64

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T2	Cocopeat	20	68
T3	Ricehusk	19	64
T4	Sawdust	20	64
T5	Soil + FYM + Sawdust	22	80
T6	Soil + Sand + Cocopeat	24	88
T7	Sand + FYM	23	84
T8	Sand + *Azotobacter*	22	84
T9	Soil + Cocopeat	19	68
T10	Soil + Sand + Ricehusk	23	84
T11	Soil + Sand	19	68
T12	Cocopeat + *Azotobacter*	22	80
T13	Soil + *Azotobacter*	19	68
T14	Ricehusk + *Azotobacter*	23	80
T15	Sawdust + *Azotobacter*	22	80
T16	Soil (control)	17	56
	SEm ±	0.28	
	C.D @ 5%	0.78	

CONCLUSION

As cocopeat contains 20 percent to 30 percent fibre of varying length, it is considered as a good growing media. Cocopeat is high in phosphorus and potassium (**Gohil *et al.* 2018)**[4]. Benefits of phosphorus in plants is that, it is good for the root growth and development . Whereas, potaasium helps in strong build up of stems. It holds upto 8-9 times its weight in water, hence it have high water holding capacity which may cause poor aeration within the media, thus affecting the oxygen diffusion to the roots. The solution to this problem is to incorporate coarser material into cocopeat could improve the aeration status of the media (Awang *et al.* 2009)[1].

FUTURE SCOPE

As there is scarcity of land, hence the supply of quality topsoil is declining rapidly. Thus, Promoting the use of soil-free media in ornamental crop production.

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