Research Article

# Effect of Different Potting Media on Bougainvillea Propagation cv. Mahara

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**Abstract**

An experiment on stimulation in rooting of *Bougainvillea buttiana* cv. Mahara using six different potting media i.e. Sand (Control), Sand: Cocopeat (1:1), Sand: Cocopeat: Perlite (1:1:1), Sand: Vermiculite:Vermicompost (1:1:1), Sand: Perlite: Vermicompost (1:1:1),Sand: Cocopeat: FYM (1:1:1) were conducted at Bougainvillea Repository, Division of Floriculture and Landscaping, IARI, New Delhi. This experiment was laid out in Completely Randomized Design (CRD) with three replications. Data were collected on days to first Sprout, no. of vegetative buds/plant, survival percentage of cutting, length of longest shoot, fresh wt. of shoots/plant, dry wt. of shoots/plant, length of longest root/plant, fresh wt. of roots/plant and dry wt. of roots/plant. The results showed that the treatment of Sand: Cocopeat : Perlite (1:1:1) was significantly better rooting than the control and all the other parameters with respect to rooting of cuttings like days to first sprout (8.66 days), no. of vegetative buds/plant (4.0), survival percentage of cutting (100%), length of longest shoot (44.75 cm), fresh wt. of shoots/plant (22.23 g), dry wt. of shoots/plant (7.41 g), length of longest root/plant (33.5 cm), fresh wt. of roots/plant (18.56 g) and dry wt. of roots/plant (6.19 g) followed by Sand: Cocopeat (1:1) compared to control and other treatments.

**Keywords:** Bougainvillea, Cutting, Potting Media

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## Introduction

Bougainvillea is a lush evergreen subtropical vine has a spreading and round plant habit with a height and spread of up to 20 feet [1] and climbing plant structure used for landscape, green house cultivation as a pot plant [2].It is used in mass plantings, as shrubs or bushes, and as ground cover [3]. The plant is used as hedges, barriers, slope covering sand it can also be trained on a tall tree, on the trunk of a dead tree or a trellis, arch, pergola or screen. It is ideally suited for growing in large pots and wooden tubs. Bougainvillea's in full bloom present a riot of colours. *Bougainvillea*, belongs to the family Nyctaginaceae, with five species include *Bougainvillea glabra, Bougainvillea buttiana, Bougainvillea peruviana, Bougainvillea spectabilis* and *Bougainvillea spinosa*. The colours of bracts are innumerable ranging from white to yellow, orange, pink, mauve, purple, scarlet, crimson and red.

Bougainvillea variety *Mahara* was the first multi-bracted Bougainvillea to arrive. It produces large compact bunches of Rhoda mine purple bracts. The plant is vigorous and free flowering. It is also known as "Million Dollar" and "Manila Magic."

The rooting in Bougainvillea is affected by many factors. Among these, media play an important role in root initiation of Bougainvillea cutting. Problems of containers growing plants which relate to the growing media are often due to physical characteristics of the soil. Most types of soils tend to become compacted when used in containers. This compaction is often accompanied by reduction in water holding capacity, drainage, aeration, water infiltration rate and perhaps roots penetration. Commercial nursery men desire to standardize their growing programs and therefore, require a growing medium which can be reproduced from year to year. So, growing media is a key material to produce high quality, container grown plants. Higher root formation can be attributed by higher water holding capacity and good aeration of rooting media. Mostly aeration is indeed for root development [4]. Different types of rooting media and their characteristics are utmost important for quality of rooted cuttings. Cuttings of many species root successfully in a variety of rooting media, but the rooting performance in terms of both number of roots and rooting percentage may be greatly influenced by the type of rooting medium used [5].There is a number of light weight media currently available on market and more constantly being added to the trade such as, Sand, peat moss, perlite, vermiculite, vermicompost and FYM**.** Trial conducted on *Monstera delicious* by growing it in three different

media and reported that bagasse + garden soil+ sand was significantly superior to other media i.e, rice hulls garden soil+sand and leaf mold+gardensoil+sand [6].

The objective of this experiment is to compare effects of various growing media on survival percentage and growth parameters of rooted cuttings of Bougainvillea plant cultivar Mahara before transplanting.

## Material and Methods

The experiment was carried out in Bougainvillea repository of the Division of Floriculture and Landscaping, Indian Agricultural Research Institute, New Delhi during the year 2018-2019. The experiment on effect of different media on root initiation and development was studied in *Bougainvillea buttiana* cv. Mahara using six different potting media.

### *Treatments*

$T_1$-Sand (Control)
$T_2$ Sand: Cocopeat (1:1)
$T_3$ Sand: Cocopeat: Perlite (1:1:1)
$T_4$ Sand: Vermiculite: Vermicompost (1:1:1)
$T_5$ Sand: Perlite: Vermicompost (1:1:1)
$T_6$ Sand: Cocopeat: FYM (1:1:1)

### *Nutrient Status of Potting media:*

Cocopeat has a carbon-nitrogen (C/N) ratio of 104:1. Cocopeat can store and release nutrients to plants for long periods of time. It is a multipurpose growing medium made out of coconut husk. It is a very good alternative to traditional peat moss and Rock wool. Vermicompost possessed higher and more soluble level of major nutrients like nitrogen, phosphorus, potassium, calcium and magnesium compared to the substrate or underlying soil, and normal compost. Vermicompost contains most nutrients in plant-available forms such as 'nitrates' (N), 'phosphates' (P), 'soluble' potassium (K), & magnesium (Mg) and 'exchangeable' phosphorus (P) & calcium' (Ca).Vermiculite is the name of a group of hydrated laminar minerals (aluminum-iron magnesium silicates) which look like mica. Horticultural vermiculite is processed with massive heat that expands it into accordion shaped pellets composed of multiple layers of thin plates. Perlite is an amorphous volcanic rock that is rich in silicon. It also attracts plant nutrients such as potassium, magnesium, calcium and phosphorus. However, it helps to create the ideal environment for life to thrive in the soil. The entire amount of nutrients present in farmyard manure is not available immediately. About 30 per cent of nitrogen, 60 to 70 per cent of phosphorus and 70 per cent of potassium are available to the first crop. In addition to nitrogen and phosphorus, manure contains zinc and sulfur, also important nutrients for crops.

For the preparation of cuttings hardwood cuttings (20cm, pencil thickness) of *Bougainvillea buttiana* cv. Mahara has been taken prepared in July, and quick dip treatment were given (15 sec.) with 4000 ppm concentrations of IBA (Indole-3 butyric acid) and planted in poly bag and kept in shade net conditions. The experiment was laid out in completely randomized design with three replications to determine the statistical significance of treatment effects. Differences were considered significant at 5% level of significance.

## Results and Discussion

Influence of different potting media on survival percentage and various growth parameters of bougainvillea rooted cuttings under shade net conditions after three month of transplanting were studied (**Table 1**). The hardwood cuttings planted in different growing media were found significantly better than the control with respect to rooting of cuttings. (*i.e.* Days to first sprout, no. of vegetative buds/plant, survival percentage of cutting, length of longest shoot, fresh wt of shoots/plant, dry wt. of shoots/plant, length of longest root, fresh wt. of roots/plant and dry wt. of roots/plant).

### *Effect of Different Potting Media on Survival Percentage of Cutting and Number of Vegetative Buds/Plant*

The survival percentage and number of vegetative buds/plant observed after 90 days of planted cutting in poly bags. The result shows in Table 1 that the survival percentage of bougainvillea varies from 45.67 to 100 %. The maximum survival percentage and no. of vegetative buds/plant of bougainvillea rooted cuttings was recorded 100% and 4.0 in ($T_3$) Sand, Cocopeat and Perlite (1:1:1) followed by 95% and 3.667 in ($T_2$) Sand and Cocopeat (1:1) potting media used and it was recorded minimum (45.66% and 2.33) in control ($T_1$) i.e. sand alone used as rooting media. These

results may be due to perlite and sand when combined with coco peat promotes faster root growth and gives quick anchorage to young roots. This mixture may help in retaining air, plant food and moisture and releasing them as when the plant requires**.** This also might be due to the rich nutritional status and better physical conditions of this mixture in which the mixture contains organic matter in form of peat, and mineral substances in form of perlite, all are good for better survival and growth of rooted cuttings than the media consisted of organic matter or mineral substance alone [7]. Influence of medium is felt before rooting occurs due to water retention and aeration properties which ultimately increase percentage, length and quality of roots [8]. Similarly researchers reported that Cocopeat releases phenolic compounds from the coir pith and also can be attributed to the beneficial physical characteristics of coir pith like aeration and water holding capacity which promotes better survival percentage of cuttings [9, 10]. Rooting and survival rates of 'Ayvalik' olive cuttings significantly reduced in sand medium, but sand-perlite mix medium significantly higher rate of rooting and survival percent compared to sand medium [11].

**Table 1** Effect of potting media on Bougainvillea Propagation cv. Mahara

| *Treatments | Days to first Sprout | No. of vegetative buds/plant | Survival percentage | Length of longest shoot (cm) | Fresh wt. of shoots/ plant (g) | Dry wt. of shoots/plant (g) | Length of longest root (cm) | Fresh wt. of roots/ plant (g) | Dry wt. of roots/ plant (g) |
|---|---|---|---|---|---|---|---|---|---|
| $T_1$ | 19.00 | 2.33 | 45.66 | 29.16 | 12.11 | 4.04 | 13.33 | 7.20 | 2.40 |
| $T_2$ | 9.00 | 3.66 | 95.00 | 41.66 | 21.13 | 7.04 | 19.00 | 9.85 | 3.28 |
| $T_3$ | 8.66 | 4.00 | 100.00 | 44.75 | 22.23 | 7.41 | 33.50 | 18.56 | 6.19 |
| $T_4$ | 10.00 | 3.00 | 63.33 | 32.66 | 15.15 | 5.05 | 17.00 | 8.58 | 2.86 |
| $T_5$ | 9.66 | 3.33 | 76.00 | 33.83 | 16.68 | 5.56 | 18.50 | 8.79 | 2.93 |
| $T_6$ | 11.33 | 2.66 | 58.33 | 29.83 | 13.12 | 4.37 | 17.16 | 7.87 | 2.62 |
| C.D.(0.05) | 3.59 | 0.84 | 7.38 | 9.55 | 6.28 | 2.09 | 5.31 | 2.43 | 0.81 |

*Treatments: $T_1$ Sand (Control) $T_2$. Sand: Cocopeat (1:1) $T_3$. Sand: Cocopeat: Perlite (1:1:1) $T_4$.Sand: Vermiculite: Vermicompost (1:1:1) $T_5$. Sand: Perlite: Vermicompost (1:1:1) $T_6$. Sand: Cocopeat: FYM (1:1:1).

### *Effect of Different Potting Media on Shoot Growth*

Among the shoot growth parameters Table 1 shows that minimum days to first sprout (8.667 Days), length of longest shoot/plant (44.75 cm), maximum fresh wt. of shoots/plant (22.33 g) and dry wt. of shoot/plant (7.41 g) was recorded in the treatment $T_3$ i.e. Sand: Cocopeat : Perlite (1:1:1) followed by $T_2$ Sand:Cocopeat (1:1) and $T_5$ Sand : Perlite : Vermicompost (1:1:1) and the minimum was recorded in $T_1$ (control) . This result was supported as the combinations might have provided favorable physical conditions and sufficient nutrients to the cuttings needed for activating enzymatic and biochemical processes [12]. Cocopeat mixed with potting media helps in maintaining the appropriate texture of the growing media and prevents compaction, thereby resulting in better root growth and shoot growth [8]. The results are in conformity with the earlier findings of beneficial effect of cocopeat and perlite on shoot growth and their development in guava cuttings [13].

### *Effect of Different Potting Media on Root Growth*

Planting of bougainvillea cutting in the mixture of Sand, Cocopeat and Perlite (1:1:1) shows maximum root growth than the all other treatments used as potting media (Table 1). The results shows that the maximum length of longest root (33.5 cm), fresh wt. of roots/plant (18.56 g) and dry wt. of roots/plant (6.19 g) was recorded in $T_3$ i.e. Sand : Cocopeat : Perlite (1:1:1) followed by Sand : Cocopeat (1:1). The minimum length of longest root/plant (13.33 cm), fresh wt. of roots/plant (7.20g) and dry wt. of roots/plant (2.40 g) was recorded in $T_1$(control). This is due to the combination of cocopeat and perlite media enhance apical meristematic activities and also trigger cambial division. Decomposed organic matter improves pore spaces, water holding capacity and microbial activity that result in a maximum root growth [12, 8]. Cocopeat mixed with potting media helps in maintaining the appropriate texture of the growing media and prevents compaction, thereby resulting in high rate of root growth and shoot growth. This might be also due to the higher water holding capacity, aeration and available organic matter of the cocopeat medium. The results are in line with the findings [14] in *Celosia cristata* and [15] in *Arabidopsis thaliana.* Some researchers [16] also stated that maximum rooting is due to free aeration as aeration helps in root respiration which encourages aerobic root respiration which ultimately yields 36 ATP of energy.

## Conclusion

It is established that rooting substrates have their own effectiveness. Rooting media shows considerable effect on root, shoot development and growth of cuttings. In the present investigation the combination of Sand, Cocopeat and Perlite (1:1:1) potting media can be viable option for production of rooted cuttings in Bougainvillea. Thus which ultimately reduces the import of Bougainvillea rooted cuttings from India and conserves the Bougainvillea species for future as well as commercial production of beautiful bougainvillea on large scale for nurserymen.

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