



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2018; 7(6): 2479-2482  
Received: 10-09-2018  
Accepted: 12-10-2018

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## Success rate of different ornamental cuttings based on different growing media

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**Abstract**

The investigation entitled "Success Rate of Different Ornamental Cuttings Based on Different Growing Media" in Allahabad at the Department of Horticulture, Naine Agricultural Institute, Sam Higginbottom Institute of Agriculture, Technology and Sciences (SHUATS), Allahabad during the year 2018. The experiment was laid out in Factorial complete randomized design (FRBD) with 27 treatment and 3 replications. All 27 possible combinations of 9 plants (Ixora, Hibiscus, Crape jasmine, Croton, Java Fig tree, Acalypha, Bougainvillea, Golden shower, Clerodendron) and 3 rooting media (soil, sand, soil + sand). On the basis of the results obtained from the present investigation, it is concluded that most suitable rooting medium for ornamental stem cuttings was M<sub>2</sub> (sand), suitable ornamental cutting was P<sub>6</sub> (Acalypha) and interaction of rooting media and ornamental cutting was P<sub>6</sub>M<sub>2</sub> (Acalypha + Sand) among all rooting medium combination.

**Keywords:** Ornamental cuttings, growing media

**Introduction**

Ornamental plants are mainly used to enhance the beauty of a garden or home. Flowering and non-flowering ornamental plants can be used in creating parks, different themed gardens, lawn borders etc. Raising and selling of ornamental plants are a good business. The cut flowers from ornamental plants can fetch you economic benefits as they are used in various floral arrangements. Apart from increasing the aesthetic value of the property, these also improve the quality of the space by acting as wind barriers, providing shade, cleaning up the pollutants in the air, reducing soil erosion and providing the habitat for animals and birds. The ornamental plants placed indoors provide a good and pleasant ambience and also purifies the air. Attractive looking ornamental plants can influence you psychologically and keeps you happy. You can achieve a calm mind and healthy body by indulging in ornamental plants gardening. The utility and importance of ornamental plants like flowering shrub in a garden or a landscape is universally acknowledged. A garden or a park without shrub will lose much of its charm, attraction and beauty. Even in small home garden where planting of trees is not possible, some selected shrubs must find a place. Many flowering shrubs are also used as cut-flowers drawing considerable demand for flower shops. Among different group of ornamental plants, flowering, shrubs, foliage shrubs and climbers, Ixora, Hibiscus, Crape jasmine, Croton, Java Fig tree, Acalypha, Bougainvillea, Golden shower and Clerodendron are the most common ornamental plant species grown in India.

*Ixora coccinea* (Ixora) is a genus of flowering plants in the Rubiaceae family. Although there are around 500 species in the genus Ixora. Ixora is used in warm climate for hedges, and screens, foundation plantings, massed in flowering beds or grown as a specimen shrub or small tree. This tight, compact shrub is much branched and tolerates hard pruning, making it ideal for formal hedges. In cooled climates, it is grown in a green house plant requiring bright light. The flowers, leaves, roots and the stem are used to treat various ailments in the Indian traditional system of medicine.

*Hibiscus rosasinensis* (Hibiscus) is a genus of flowering plants in the family, Malvaceae. The genus includes both annual and perennial herbaceous plants, as well as woody shrubs and small trees. The leaves are alternate, the flowers are large, conspicuous, trumpet-shaped, with five or more petals, colour from white to pink, red, orange, peach, yellow or purple. Many Hibiscus are grown for their showy flowers or used as landscape shrubs. Hibiscus is a perennial plant and commonly grown as hedges plant and is very important in Hindu devotion. *Tabermontana divaricate* (Apocynaceae), commonly called pinwheel flower, crape jasmine, East India rosebay and Nero's crown is an evergreen shrub. Both single and double flowered forms are cultivated, the flowers of both forms being white. The flowers of the single form are

unscented but the double- flowered form has a pleasing fragrance. The large shiny leaves are deep green and are 6 or more inches in length. Flowers are commonly used in Pooja in South India. It is commonly cultivated in gardens for its showy, sweetly gradient flowers, glossy green foliage and shapes and also as a fragment hedge.

*Codiaeum variegatum* (Croton) is extensive flowering plants, Euphorbiaceae family. *Codiaeum* is a genus of lovely ornamental plants known for their attractive and colourful foliage. Croton plants stiff, leathery leaves in bold colors of yellow, pink, red, orange and green make it beautiful and popular house plant. Croton plants used as ornamental shrubs and house plants.

*Ficus benjamina*, commonly known as weeping fig, benjamin fig or Ficus tree, is a species of flowering plant in the family Moraceae, *Ficoidae* an evergreen tree with a dense, wide crown, being widely cultivated in the tropical and subtropical and used as an avenue and shade providing tree. It has been an extremely popular indoor house plant because of its attractive shape and tolerance for a variety of growing conditions.

*Acalypha wilkesiana* (Acalypha) is a genus of flowering plants in the family Euphorbiaceae. The genus includes annuals or perennial herbs, shrubs, and small trees. Most are monoecious, and some are dioecious. The leaves are alternately arranged, undivided. Acalyphas an erect or spreading, evergreen that can grow 2-4meters tall. It is widely cultivated as an ornamental plant, being especially valued for its wide range variegated cultivars, and is also often grown as a hedge.

*Bougainvillea glabra* (Bougainvillea) are among the most floriferous shrubby climbing plant, producing beautiful color effects which can hardly be excelled by any other plant. In recent years, these have become one of the most popular garden plants all over the world. It is a member of the family Nyctaginaceae, Flowers are usually inconspicuous and surrounded by brilliantly colored papery bracts that persist on the plants for a long time. Bougainville is also often used as a formal hedge or ground cover.

*Clerodendrum splendens* (Hill Glory Bower) is a genus of flowering plants in the family Verbenaceae. Clerodendrum is weak- stemmed evergreen shrubs and herbaceous perennials with a more or less climbing habit. It is widely grown as an ornamental, valued especially for its floral display. Flowers which are produced on wiry flowers stalks stems end during the spring and autumn.

*Pyrostegia venusta* (Gloden shower) also commonly known as flame vine. cascading like a waterfall of orange trumpets. Vigorous, it flowers for many months, from soon after Christmas until winter. The plants form dense masses, growing up trees, on walls or over rocks and flowers in the cool, dry season.

Ornamental plants can be propagate either sexually (by seed) or asexually (by vegetative means). A number of horticultural plants especially ornamental plants are propagated commercially by vegetative means. Many ornamental plants do not normally produce any viable seed. On the other hand, this unique characteristic may be deteriorated due to cross pollination when it is propagated through seed. Among the vegetative means, stem cutting is one of the easiest, cheapest and least time consuming methods of plant propagation.

Cutting technique is the widely utilized vegetative method for propagating different plant species. Commercial propagators have developed techniques that successfully manipulate environmental conditions to maximize rooting of cuttings.

The success of rooting of cuttings is affected by many factors, such as the plant part's age and its location on the plant, nutritional levels of the stock plants, seasonal timing, cuttings type used, rooting medium and environmental manipulation and treatments of cuttings. Some plants root better at a particular stage of growth, at a specific time of the year, or using a particular technique. Seasonal timing or the period of the year in which cuttings are taken, could play an important role in rooting of plant species especially woody plants (Harrison-Murray 1991) [10]. With many plant species there is an optimal period of the year for taking cutting materials and consequently rooting (Anand and Haberlein 1975) [5]

Rooting medium is any type of substrate that encourages root growth. This substrate normally comprises of different organic components and minerals. The best type of rooting medium depends on a grower's available materials and plant species. A rooting medium is any grow media used to start (propagate) new plants, whether they be seeds or cuttings. Often, once a new plant develops roots in the rooting medium, they are transferred to either a larger home that contains more of the same medium, or a new medium altogether. Rooting mediums are often used together with synthetic or organic rooting hormones, which have been known to act as a catalyst for root growth while protecting the root cuttings from various types of ailments and fungi.

## Materials and Methods

The research study was conducted in Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh during the period of February, 2018 to May, 2018. Different ornamental cuttings were collected from the department of Horticulture, Allahabad.

Plots of 27 were thoroughly filled with media according to treatment combination i.e., M1 (soil), M2 (sand) and M3 (soil+sand) and ornamental plants are P1 (Iroora), P2 (Hibiscus), P3 (Chandini), P4 (Croton), P5 (Ficus), P6 (Acalypha), P7 (Bougainvillea), P8 (Gloden shower), P9 (Clerodendrum).

The different treatment combinations are as follows; T1 (P1M1), T2 (P1M2), T3 (P1M3), T4 (P2M1), T5 (P2M2), T6 (P2M3), T7 (P3M1), T8 (P3M2), T9 (P3M3), T10 (P4M1), T11 (P4M2), T12 (P4M3), T13 (P5M1), T14 (P5M2), T15 (P5M3), T16 (P6M1), T17 (P6M2), T18 (P6M3), T19 (P7M1), T20 (P7M2), T21 (P7M3), T22 (P8M1), T23 (P8M2), T24 (P8M3), T25 (P9M1), T26 (P9M2), and T27 (P9M3). The growth parameters including No of leaves (90days), Length of the 1<sup>st</sup> branch (90days), Rooting percentage.

## Results and Discussion

Maximum number of leaves at 90 days (22.66) was observed in P<sub>2</sub>M<sub>2</sub> (Hibiscus+Sand) followed by (21.33) in P<sub>2</sub>M<sub>3</sub> (Hibiscus+soil+sand) and minimum in (6.00) was observed in P<sub>4</sub>M<sub>1</sub> (Croton+Soil). The difference in number of leaves per cutting is due different rooting media and vigour of the plant. Sand will provide good aeration, good water holding capacity and moisture to cuttings So the medium which helps to more number of leaves. Maximum length of 1<sup>st</sup> branch (cm) at 90 days (10.28) was observed in P<sub>3</sub>M<sub>2</sub> (Chandini+Sand) followed by (9.44) in P<sub>6</sub>M<sub>3</sub> (Acalypha+Soil+Sand) and minimum in (2.17) was observed in P<sub>9</sub>M<sub>1</sub> (Clerodendron+Soil+Sand). The difference in length of 1<sup>st</sup> branch at 90 days is due different rooting media and vigour of the plant Sand will provide good aeration, good water holding capacity and moisture to

cuttings. So the medium which helps to more length of branch. Maximum percentage of rooting (88.89) was observed in P<sub>2</sub>M<sub>2</sub> (Hibiscus+Sand), P<sub>3</sub>M<sub>3</sub> (Crape jasmine +Sand) and P<sub>6</sub>M<sub>2</sub> (Acalypha+Sand) and minimum percentage in (33.33) was observed in P<sub>8</sub>M<sub>1</sub> (Gloden shower+ Soil). The

difference in percentage of rooting is due to different rooting media and vigour of the plant. Sand will provide good aeration, good water holding capacity and moisture to cuttings so the medium which helps to more rooting percentage.

**Table 1:** Effect of rooting media on number of leaves at 90 days of different ornamental cuttings.

Levels of Plants (P)	Media (M)			Mean (P)
	M1 (Soil)	M2 (Sand)	M3 (Soil+Sand)	
P1(Ixora)	6.33	6.67	6.17	6.390
P2(Hibiscus)	17.17	22.66	21.33	20.387
P3(Crape jasmine)	9.83	11.67	10.33	10.610
P4(Croton)	6.00	6.55	7.33	6.627
P5(Java Fig tree)	7.33	9.33	6.87	7.843
P6(Acalypha)	9.50	18.50	21.27	16.423
P7(Bougainvillea)	8.83	10.22	10.50	9.850
P8(Golden shower)	9.33	13.00	13.17	11.833
P9(Clerodendron)	7.83	8.33	7.00	7.720
Mean (M)	9.13	11.88	11.55	
	F-test	S. Em. (±)	C.D. at 5%	
Plants (P)	S	0.496	1.013	
Media (M)	S	0.286	0.585	
Int. (P x M)	S	0.859	1.755	

**Table 2:** Effect of rooting media on Length of 1st branch (cm) 90 days of different ornamental cuttings.

Levels of Plants (P)	Media (M)			Mean (P)
	M1(Soil)	M2(Sand)	M3(Soil+Sand)	
P1(Ixora)	2.35	2.82	2.75	2.620
P2(Hibiscus)	7.73	7.98	8.74	8.150
P3(Crape jasmine)	8.50	10.28	9.22	9.333
P4(Croton)	3.23	5.89	5.33	4.817
P5(Java Fig tree)	7.25	9.38	8.30	8.310
P6(Acalypha)	8.58	9.30	9.44	9.107
P7(Bougainvillea)	3.42	3.80	3.50	3.573
P8(Golden shower)	4.17	9.67	9.03	7.623
P9(Clerodendron)	2.45	3.30	2.17	2.640
Mean (M)	5.30	6.94	6.50	
	F-test	S. Em. (±)	C.D. at 5%	
Plants (P)	S	0.368	0.752	
Media (M)	S	0.213	0.434	
Int. (P x M)	S	0.638	1.302	

**Table 3:** Effect of rooting media on rooting % of different ornamental cuttings

Levels of Plants (P)	Media (M)			Mean (P)
	M1	M2	M3	
P1	55.55	77.77	55.55	62.958
P2	66.66	88.89	77.77	77.775
P3	66.66	88.89	77.78	77.776
P4	33.33	77.78	44.44	51.849
P5	55.55	77.77	77.77	70.366
P6	55.55	88.89	77.77	74.070
P7	55.55	77.77	44.44	59.254
P8	33.33	66.66	66.66	55.550
P9	44.44	66.66	55.55	55.550
Mean (M)	51.85	79.01	64.19	
	F-test	S. Em. (±)	C.D. at 5%	
Plants (P)	S	0.571	1.167	
Media (M)	S	0.330	0.674	
Int. (P x M)	S	0.990	2.021	

## Conclusion

On the basis of the results obtained from the present investigation, it is concluded that most suitable rooting medium for ornamental stem cuttings was M<sub>2</sub> (sand), suitable ornamental cutting was P<sub>6</sub> (Acalypha) and interaction of rooting media and ornamental cutting was P<sub>6</sub>M<sub>2</sub> (Acalypha + Sand) among all rooting medium combination.

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