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Influence of different growing media compositions on *Hibiscus* propagation through cutting technique

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ABSTRACT

This study investigates the efficacy of various growing media compositions on the propagation of Hibiscus rosa-sinensis stem cuttings. The experiment was conducted at the Horticulture farm of Sher-e-Bangla Agricultural University between September 2023 to December 2023. The treatments of this experiment are T₁: Sand, T₂: Garden soil (Virgin soil), T₃: Cocopeat T₄: Vermicompost T₅: Sand: Vermicompost (1:1), T₆: Garden Soil: Vermicompost (1:1), T₇: Cocopeat: Vermicompost (1:1). The experiment was laid out in Completely Randomized Design (CRD) with three replications. Data on growth and quality attributes parameters were taken in which all treatments showed significant variation. Among all the parameters of growth performance, the maximum leaf number per cutting (16) found in T₄ and minimum leaf number (12) is found in T₉, maximum root number per cutting (6.0), which is found in T₄ and minimum root number per cutting (2) is found in T₁, T₂ and T₉. The highest value of root length is (58.3mm) found in T₄ and T₈, measured at the lowest value (2.0 mm). Maximum leaf area found in T₄ (10.5 sq.cm) and minimum leaf area found in T₆ (2.2 sq.cm). Highest survival rate is 100% found in T₄ and T₅. Above all, comparing among treatments, vermicompost (T₄) showed superior performance across multiple metrics, other treatments were well received and performed well in terms of quality parameters. The study underscores the benefits of vermicompost as an optimal medium for stem cutting propagation, attributing its effectiveness to its rich nutrient content, loose structure, and enhanced water holding capacity. These findings suggest that vermicompost holds promise as an efficient medium for nursery owners, offering high survival rates and potential economic benefits.

Key Words: *Hibiscus rosa-sinensis*; Vegetative propagation, Stem cutting and Growing media.

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I. Introduction

Hibiscus (*Hibiscus rosa-sinensis*) refers to a genus of flowers of the Malvaceae family (Anil et al., 2012). *Hibiscus* plant is native to tropical and south eastern Asia (China). This plant is commonly found

throughout the tropics and as a house plant throughout the world. HRS is not only a medicinal plant but is also considered a natural health product in many countries (Anil et al., 2012 and Reddy et al., 2007). In southern India, HRS is believed to contain vital nutrients. Cultivated varieties have red, white, yellow, orange and multicolour flowers. Many species of Hibiscus are grown for their showy flowers or used as landscape shrubs. According to Chin (1986), the magnificent large blooms usually last a day or two. This popular landscape shrub creates a bold effect with its bed textured, glossy dark green leaves and with 4- 6-inch-wide and up to 8-inch-long, showy flowers, produced throughout the year and grows up to 7-12. Hibiscus is propagated through vegetative methods by cutting and grafting to produce quality planting material on a large scale. Types of media have significantly influenced the rooting and vegetative growth of cuttings. Growing media should be considered an essential part of the propagation system because rooting competency depends on the type of medium used. Rooting medium directly affects on quality and percentage of rooting (Lanyon DM et al., 2004 and Sadhu MK et al., 1986). Soil contains organic matter and nutritive elements in various amounts but these elements usually become insufficient when the soil is continuously utilized. Therefore, it should be supplemented with ecologically friendly organic materials as rooting media for the better performance of cuttings. According to K. Renuka et al, (2015), among different factors governing root development, media plays a very important role, it holds the cuttings in position, provides them with moisture and aeration. An ideal rooting medium should be porous enough to allow good aeration and should possess high water holding ability. The type of rooting medium to some extent determines the nature of roots produced on the cutting (Nanda and Kochhar, 1985). Therefore, this study was initiated to identify the most suitable growing media composition on Hibiscus propagation through cutting technique.

II. Materials and Methods

The experiment was conducted in the Horticulture Farm, Sher-e-Bangla Agricultural University, Dhaka, from September 2023 to December 2023. The single factor experiment was laid out in Completely Randomized Design (CRD) with five replications. The different growing media compositions were as follows; T₁: Sand, T₂: Garden soil (Virgin soil), T₃: Cocopeat, T₄: Vermicompost, T₅: Sand: Vermicompost (1:1), T₆: Garden Soil: Vermicompost (1:1), T₇: Cocopeat: Vermicompost (1:1), T₈: Sand: Cocopeat: Vermicompost (1:1:1) and T₉: Garden soil: Cocopeat: Vermicompost (1:1:1). The cutting was taken from healthy mother plants using a pruning shear disinfected with alcohol. The hibiscus cutting should be 10 to 15 cm. long. Cuttings were roughly cut half an inch below the node, aloe vera gel as rooting hormone was applied to the cutting and the cuttings were planted in different media according to the treatments. Each cutting was tagged according to treatment for data collection. Experimental observation was maintained carefully several times after cuttings were planted and interculture operations were performed as necessary. After 45 days when leaves started growing from each cutting, leaf area, leaf number, root number and root length were measured according to the different treatments under the scientific method. All the data were statistically analyzed using the standard statistical data analysis software. The analysis of variance (ANOVA) was conducted to assess the differences between treatments. The Least Significance Difference (LSD) test, as Gomez and Gomez (1984) proposed, was employed at a significance level of 5%.

III. Results and Discussion

Number of visible roots

Visible Roots on hibiscus stem cutting propagation exposed significant variation among the treatments. T₄ showed maximum (6.0) root and other treatments showed minimum root per stem cutting compared to T₄ (Table 01). Vermicompost is a process based on earthworms and microorganisms, whose joint action provides degradation and detoxification of organic waste as well as conversion into a compost product. Vermicompost is a rich source of all essential plant nutrients. Due to the loose structure of vermicompost with higher water holding capacity of vermicompost containing plant nutrients, a greater number of roots emerged. F. Fornes et al., (2013), found that vermicompost is more appropriate as rooting media in *E. japonicas*.

Similar results were reported by Shirol et al. (2001) in dwarf poinsettia, they recorded maximum root development with vermicompost as a rooting media, these reports were in confirmatory with Mahale et al. (2002) and Bharathy et al. (2003) in carnation.

Root length

Significant variation in root length was observed due to the different treatments. Among the different growing media compositions, the maximum root length (6.0 mm) was found in T₄ while T₈ measured the minimum value (1.9 mm). Rooting media is one of the most important factors for rooted cutting production and growing media has significantly influenced the rooting and vegetative growth of cuttings (Jaleta and Sulaiman, 2019). As vermicompost is rich in NPK and micronutrients, the number of roots in the cutting was increased as well as the length of the roots. A similar opinion was expressed by Mahale et al. (2002) who reported that vermicompost is the optimum medium for rooting carnations.

Table 01. Influence of different potting media composition on propagation of *Hibiscus* spp.

Treatment	Root number per cutting		Root length (mm)		Leaf number per cutting		Leaf area (sq. cm.)		Survival rate (%)
T ₁	2.0	b	2.0	b	15.6	ab	2.4	ef	20.0
T ₂	2.0	b	2.0	b	15.7	ab	3.5	d	80.0
T ₃	3.0	b	3.0	b	16.0	a	6.2	b	60.0
T ₄	6.0	a	6.0	a	16.6	ab	10.5	a	100.0
T ₅	3.0	b	3.0	b	16.2	a	3.3	d	100.0
T ₆	2.0	b	2.0	b	10.0	c	2.2	f	80.0
T ₇	4.0	ab	4.0	ab	16.0	ab	2.2	f	80.0
T ₈	3.0	b	1.9	b	16.5	a	4.5	c	60.0
T ₉	2.0	b	2.0	b	12.0	bc	3.0	de	80.0
CV%	30.0		30.0		10.5		5.6		-
LSD	2.9		2.9		4.5		0.6		-

T₁: Sand; T₂: Garden soil (Virgin soil); T₃: Cocopeat; T₄: Vermicompost; T₅: Sand: Vermicompost (1:1); T₆: Garden Soil: Vermicompost (1:1); T₇: Cocoapeat: Vermicompost (1:1); T₈: Sand: Cocoapeat: Vermicompost (1:1:1); and T₉: Garden soil: Cocoapeat: Vermicompost (1:1:1)



Plate 1. Influence of different growing media composition on leaves number and leaf area of *Hibiscus* propagation.

Here, T₁: Sand; T₂: Garden soil (Virgin soil); T₃: Cocopeat; T₄: Vermicompost; T₅: Sand: Vermicompost (1:1); T₆: Garden Soil: Vermicompost (1:1); T₇: Cocopeat: Vermicompost (1:1); T₈: Sand: Cocopeat: Vermicompost (1:1:1); and T₉: Garden soil: Cocopeat: Vermicompost (1:1:1)

Leaf number

Number of leaves showed significant variation with different treatments under this experiment. Maximum number of leaves was observed in T₄ (16.6) and the minimum was observed in T₉ (12.0)

(Table 01). Vermicompost growing media has higher aeration, porosity bulk density and higher water holding capacity as well as higher plant nutrients, resulting in more leaves in cutting. The better response of vermicompost and sand containing rooting medium may be attributed to optimum nutrient uptake and enhanced availability of nutrients and growth promoting substances in the vermicompost containing rooting (Suhane, 2007 and Munroe, 2007).

Leaf area

Leaf area showed significant variation in different treatments of this experiment. The maximum leaf area found in T₄ (10.9 sq.cm) and minimum leaf area found in T₆ (2.2sq cm) (Table 01). According to Sivapandian et al. (2009) vermicompost increases the leaf area of *H. esculentus* in leaf litter vermicompost-amended soil (compared to plants in other treatments) probably favors increased photosynthetic activity, which might lead to increased yield of the plant.

Survival rate

Significant variation in survival rate of the cuttings was found among the different growing media compositions at 90 days after cutting placement. Maximum survival rate (100%) was found with T₄ (Vermicompost) which was statistically significant with T₅ (Sand: vermicompost=1:1) and the lowest survival rate (20%) was found in T₁ (Table 01). Similar results were reported by Kumar et al. (2021) in stem cuttings of pomegranate (*Punica granatum L.*). They recorded maximum survival rate using vermicompost as a rooting media over other treatments. According to Kumar et al. (2021), addition of vermicompost and sand in the sawdust deficient rooting medium creates favorable conditions for optimum growth of cuttings due to better moisture retaining capacity, and high nutritive and growth promotive values of vermicompost and also due to better aeration, drainage and porous quality of sand.

IV. Conclusion

With respect to the above result, it can be concluded that Hibiscus flower showed significant variation in stem-cutting propagation in different rooting media. According to the result, T₄ (vermicompost) showed maximum visible root, number of leaves, maximum root number. From this experiment, we found that Vermicompost is more suitable for stem-cutting propagation than other media. Nursery owners will benefit economically if they produce seedlings by using vermicompost. Because the survival rate of seedlings produced in vermicompost is high.

References

- [1]. Anil Kumar, A. and Singh, A. (2012). "Review on Hibiscus rosa sinensis." International Journal of Research in Pharmaceutical and Biomedical Sciences, (3.2) 534-538.
- [2]. Bharathy, P. V., Sonawane, P. C. and Sasnu, A. (2003). Effect of different planting media on rooting of cuttings in carnation (*Dianthus caryophyllus L.*). Journal of Maharashtra Agricultural Universities, 28(3), 343-344.
- [3]. Chin, H. F. (1986). The Hibiscus, Queen of Tropical Flowers. Tropical Press Sdn. Bhd., Kuala Lumpur, 151.
- [4]. Fornes Sebastiá, Fernando, D., Mendoza-Hernandez, and Rosa María Belda Navarro (2013). Compost versus vermicompost as substrate constituents for rooting shrub cuttings. Spanish Journal of Agricultural Research, 11(2), 518-528. <https://doi.org/10.5424/sjar/2013112-3304>
- [5]. Jaleta, A. and Sulaiman, M. (2019). A Review on the Effect of Rooting Media on Rooting and Growth of Cutting Propagated Grape (*Vitis vinifera L.*). World Journal of Agriculture and Soil Science, 2641-6379. <https://doi.org/10.33552/WJASS.2019.03.000567>
- [6]. Kumar, S., Prakash, S., Malik, S. and Dhyani, B. P. (2021). Effect of different rooting media treatments on rooting and growth of stem cuttings in pomegranate (*Punica granatum L.*) The Pharma Innovation Journal, 10(3), 475-479. <https://doi.org/10.20546/ijcmas.2020.910.413>
- [7]. Lanyon, D. M., Cass, A. and Hansen, D. (2004). The effect of soil properties on vine performance. CSIRO Land and Water Technical Report. 34(4), 1-54.
- [8]. Mahale, V. G., Ashok, T. H. and Kale, R. D. (2002). Vermicompost as rooting medium for carnation (*Dianthus caryophyllus L.*). Journal of Plant Biology, 29(2), 175-178.

- [9]. Munroe, G. (2007). Manual of On-farm Vermicomposting and Vermiculture; Publication of Organic Agriculture Centre of Canada. p.39.
- [10]. Nanda, K. K. and Kochhar, V. K. (1985). Propagation through cuttings. *In: Vegetative Propagation of Plants*. Kalyani Publishers. 123-193pp.
- [11]. Reddy, K. N., Pattanaik, C., Reddy, C. S. and Raju, V. S. (2007). Traditional knowledge on wild food plants in Andhra Pradesh. *Indian Journal of Traditional Knowledge*, 6(1), 223–229
- [12]. Renuka, K., Chandrasekhari, R. and Pratap. M. (2015). Effect of different media treatments on rooting of carnation (*Dainathus cryophyllus* L.) cuttings of cv. BALTICO under polyhouse conditions. *The Asian Journal of Horticulture.*, 10(1), 118-121. <https://doi.org/10.15740/HAS/TAJH/10.1/118-121>
- [13]. Sadhu, M. K. (1986). Vegetative propagation practices. *In: Propagation of tropical and subtropical horticultural crops* (ed Bose TK, Mitra SK and Sadhu MK). Naya Prokash, Kolkata, pp. 36-38.
- [14]. Shirol, A. M., Kulkarni, B. S., Reddy, B. S., Kanamadi, V. C. and Thammaih, N. (2001). Influence of different rooting media on root ability of tip cuttings of dwarf poinsettia. *Karnataka Journal of Agricultural Science*, 14(4), 1145-1146.
- [15]. Sivapandian, V., Nithya, S., Kumar, N. S., Rita, S. and Ramaswamy. M. (2009). Effect of vermicompost on vegetative growth and fruiting in *Hibiscus esculentus*. *Journal of Eco biology*, 24(1), 1-10.
- [16]. Suhane, R. K. (2007). Vermicompost, cattle-dung compost and chemical fertilizers. *Nature Environment and Pollution Technology*, 5(2), 197-201.

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