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Effect of growing media combinations on the growth of ornamental foliage plants in pot culture

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Abstract

An experiment entitled “Effect of Growing Media and Media Combinations on the Growth of Ornamental Foliage Plants in pot culture”. This study aims to discover the optimal media combination for Dieffenbachia growth. The site of experiment is situated at 23°N latitude and 89°E longitudes at an elevation of 9.75 meters from mean sea level. The investigation involved 7 treatment combinations. T₁: Soil + sand + FYM (2:1:1), T₂: Soil + sand + vermicompost (2:1:1), T₃: Soil + sand + FYM + vermicompost (2:1:1.0:0.5), T₄: Cocopeat only, T₅ Cocopeat + sand + FYM (2:1:1), T₆: Cocopeat + sand + vermicompost (2:1:1) and T₇: Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5). The results of the study revealed that the treatment T₃ (Soil + Sand + FYM + Vermi-compost (2:1:1.0:0.5) significantly improved vegetative attributes of Dieffenbachia.

Keywords: Dieffenbachia, pot culture, media compositions, growth parameters

Introduction

Potted ornamental foliage plants are becoming increasingly popular due to rapid urbanization and changing lifestyles worldwide. These plants are easy to transport and are widely used for both indoor gardening and instant outdoor landscaping. Potted ornamental plants include flowering as well as foliage species. Foliage plants are primarily valued for their attractive leaves and decorative appearance, and they can thrive for extended periods under indoor environmental conditions, making them ideal for homes, offices, and other interior spaces.

Foliage plants are ornamental plants cultivated primarily for their attractive leaves and are widely used for indoor decoration and interior landscaping. Their importance has increased significantly in recent years due to the growing demand for aesthetically pleasing indoor environments. These plants are highly valued as indoor plants because of their diverse leaf colours, textures, shapes, and their ability to thrive under low-light conditions. In addition, cut foliage is extensively used in bouquets, floral arrangements, and floral decorations, either in combination with flowers or alone, to enhance visual appeal through its unique forms, textures, and colours. In commercial indoor plant production, a wide range of growing media are used worldwide, as they play a crucial role in determining the growth, quality, and market value of potted ornamental plants. Although garden soil is the most commonly available growing medium, its use in pot culture is limited due to its heavy weight, poor handling characteristics, and increasing competition for its use in agriculture and construction activities. Consequently, the availability of garden soil for the production of potted ornamental plants has become increasingly restricted. Soilless growing media have gained widespread acceptance among commercial growers due to their uniformity, excellent aeration, reproducibility, and low bulk density, which help reduce transportation and handling costs of both the media and finished plants (Nazari *et al.*, 2011) [6]. The physical and chemical characteristics of potting media greatly influence plant growth; therefore, combinations of different media components are generally preferred over a single medium for foliage plant production, as they provide superior vegetative growth and overall aesthetic quality (Panj *et al.*, 2014) [7].

Potting media used for indoor and ornamental foliage plants typically consist of varying proportions of organic and inorganic materials. Organic components such as compost, farmyard

manure, vermicompost, and coco peat improve nutrient availability and water-holding capacity, while inorganic materials like sand, perlite, gravel, and silt enhance drainage and aeration. In recent years, several alternative substrates have been adopted for both commercial and domestic cultivation to improve plant performance and sustainability.

In the present study, different combinations of soil, sand, coco peat, vermicompost, and FYM were evaluated in varying proportions to identify a suitable growing medium for the successful cultivation of ornamental foliage plants.

Materials and Methods

The present study was conducted in shade net house installed at AICRP on Floriculture, Mohanpur, BCKV. All cultural practices were maintained same in all treatments. Data were recorded on plant height, Number of leaves, Leaf length, Leaf width and Plant spread. Five pots per treatments were raised and the following seven types of treatments (media) were used. T₁: Soil + sand + FYM (2:1:1), T₂: Soil + sand + vermicompost (2:1:1), T₃: Soil + sand + FYM + vermicompost (2:1:1.0:0.5), T₄: Cocopeat only, T₅: Cocopeat + sand + FYM (2:1:1), T₆: Cocopeat + sand + vermicompost (2:1:1) and T₇: Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5). Observation of growth parameters After transplantation, the response of the foliage plant was studied for further analysis and evaluation was done on the basis of vegetative growth parameters such as plant height, number of leaves, leaf length, leaf width and plant spread. The following particulars were recorded throughout the research study and analysis was done.

Plant height (cm)

The data recorded on plant height has been presented in Table-1. Among different growing media, maximum plant height (80 cm) was observed in T₃ Soil + sand + FYM + vermicompost (2:1:1.0:0.5). On the other hand, minimum plant height (57.00 cm) was recorded when plants were grown in T₇ Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5).

The increase in plant height may be due to supply of organic sources nutrients as they are rich in micronutrients beside having plant growth promoting substances viz., hormones, enzymes and humus forming beneficial microbes. Organic sources, on application to the soil, improve the physical properties of the soil such as aggregation, aeration, permeability and water holding capacity and proper drainage of media containing which may promote growth and development of plants. Similar findings were also reported by Treder (2008) [9] in oriental lily, Kumar (2015) [5] in Tuberose and Chaudhary *et al.* (2018) [2] in Lilium.

Table 1: Effect of various media compositions on plant growth parameters of Dieffenbachia

S. No.	Treatment Name	Plant height (cm)
1	Soil + sand + FYM (2:1:1)	74
2	Soil + sand + vermicompost (2:1:1)	64
3	Soil + sand + FYM + vermicompost (2:1:1.0:0.5)	80
4	Cocopeat only	58
5	Cocopeat + sand + FYM (2:1:1)	69
6	Cocopeat + sand + vermicompost (2:1:1)	64
7	Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5)	57

Number of leaves per plant

The data recorded on number of leaves has been presented in Table-2 and from perusal of the data it is quite evident that the number of leaves was significantly affected by various substrates

and the highest number of leaves (7) was found in treatment T₃ Soil + sand + FYM + vermicompost (2:1:1.0:0.5) and T₄ Cocopeat only. As reported by Atif *et al.* (2016) [1], Farm Yard Manure serves as basic supply of nutrients for the plant. The decaying combination of manure and urine of cattle farms on average accounts for holding 0.5% N, 0.2% P₂O₅ and 0.5% K₂O, similarly urine contains approximately 1% N and 1.35% P₂O₅. The existing organic media combination of Farm Yard Manure and vermicompost contains macronutrients such as N, P, and K and adequate quantities of micronutrient which are essential for plant development in addition; the nutrient elements in the soil improved the physical properties of soil. The study indicated that certain chemical and physical properties of cocopeat had positive effect and improved the effect on growth and development of leaves as reported by Yahya *et al.* (2003) [10].

Table 2: Effect of growing media on the number of leaves on Dieffenbachia

S. No.	Treatment Name	No. of leaves plant ⁻¹
1	Soil + sand + FYM (2:1:1)	4
2	Soil + sand + vermicompost (2:1:1)	3
3	Soil + sand + FYM + vermicompost (2:1:1.0:0.5)	7
4	Cocopeat only	7
5	Cocopeat + sand + FYM (2:1:1)	4
6	Cocopeat + sand + vermicompost (2:1:1)	4
7	Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5)	5

Leaf length (Cm)

The data observed and presented in table 3 showed that the leaf length (cm) was found to be significant affected by application of pot mixture. The data regarding the leaf length maximum (48 cm) was recorded in the treatment T₂: Soil + sand + vermicompost (2:1:1) followed by followed by T₄ - cocopeat and the media composition (T₆) Cocopeat + sand + vermicompost (2:1:1) registered significantly minimum leaf length (29.5 cm) was presented in Table 3. Incorporating vermicompost into a growing medium positively impacts plant growth and development by influencing both vegetative growths. Vermicompost had higher and more soluble levels of nutrients such as nitrogen, phosphorous, potassium, calcium, and magnesium. Moreover, it enhances the physical structure of the medium and enriches it with beneficial microorganisms. An improvement in growth due to vermicompost in potted ornamentals has been reported by Kayalvizhi *et al.* (2013) [4] in Asparagus densiflorus, Fatmi and Singh (2017) [3] in Codiaeum, and Sandeep *et al.* (2018) [8] in Nephrolepis.

Table 3: Effect of growing media on leaf length of Dieffenbachia

S. No.	Treatment Name	Leaf length (cm)
1	Soil + sand + FYM (2:1:1)	42
2	Soil + sand + vermicompost (2:1:1)	48
3	Soil + sand + FYM + vermicompost (2:1:1.0:0.5)	41
4	Cocopeat only	43
5	Cocopeat + sand + FYM (2:1:1)	41
6	Cocopeat + sand + vermicompost (2:1:1)	29.5
7	Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5)	32

Leaf width (cm)

Various combinations of potting media significantly influenced the leaf width at all stages of plant growth. Treatment T₁ - Soil + sand + FYM (2:1:1) showed maximum leaf width (18.6 cm) and

T₅ - cocopeat + sand + FYM (2:1:1) was on par (17.5 cm) with it. On the other hand, minimum leaf width of (13.5 cm) was recorded under Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5) media combination.

Table 4: Effect of growing media on leaf width of Dieffenbachia

S. No.	Treatment Name	Leaf width (cm)
1	Soil + sand + FYM (2:1:1)	18.6
2	Soil + sand + vermicompost (2:1:1)	14
3	Soil + sand + FYM + vermicompost (2:1:1.0:0.5)	15
4	Cocopeat only	16.30
5	Cocopeat + sand + FYM (2:1:1)	17.5
6	Cocopeat + sand + vermicompost (2:1:1)	15
7	Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5)	13.5

Plant spread

Potting media made of soil + sand + FYM + vermicompost (2:1:1.0:0.5) was found to have the greatest plant spread (61x62 cm) among the different combinations. This was followed by media made of cocopeat + sand + FYM (2:1:1) (46x71 cm) and soil + sand + vermicompost (2:1:1) (60x51 cm).

Table 5: Effect of growing media on plant spread of Dieffenbachia

S. No.	Treatment Name	Plant spread (cm)
1	Soil + sand + FYM (2:1:1)	54 x 36
2	Soil + sand + vermicompost (2:1:1)	60x51
3	Soil + sand + FYM + vermicompost (2:1:1.0:0.5)	61x62
4	Cocopeat only	53x30
5	Cocopeat + sand + FYM (2:1:1)	46X71
6	Cocopeat + sand + vermicompost (2:1:1)	66X29
7	Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5)	49X35

Conclusion

The aesthetic appeal of potted ornamental foliage plants is greatly influenced by several factors, such as plant height and spread, and the fullness of the pot depends on the number of leaves and their area. The leaf production interval determines the number of leaves and directly influences the appearance of potted plants. Parameters such as leaf length and width also affect the presentability of potted ornamental foliage plants, as they contribute to the overall leaf area.

Among all treatments tested, media composition was observed in treatment T₃ (Soil + sand + FYM + vermicompost (2:1:1.0:0.5)) was most satisfactory with respect to all the growth and quality parameters. The combination of soil, vermicompost, FYM and sand provided optimal aeration, water retention and nutrient availability, enhancing plantlet establishment and highlight the importance of selecting an appropriate potting medium.

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