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Kommu Pavan Kumar
Ph.D. Scholar Department of
Floriculture and Landscape
Architecture, Bidhan Chandra
Krishi Viswavidyalaya, West
Bengal, India

Tapas Kumar Chowdhuri
Associate Professor, Faculty of
Horticulture, Department of
Floriculture and Landscape
Architecture, Bidhan Chandra
Krishi Viswavidyalaya, West
Bengal, India

Raghunath Sadhukan
Associate Professor, Faculty of
Agriculture, Department of
Genetics and Plant Breeding,
Bidhan Chandra Krishi
Viswavidyalaya, West Bengal,
India

Corresponding Author:
Kommu Pavan Kumar
Ph.D. Scholar Department of
Floriculture and Landscape
Architecture, Bidhan Chandra
Krishi Viswavidyalaya, West
Bengal, India

Studies on the effect of potting media on growth of *Chlorophytum comosum* ornamental foliage plant

Kommu Pavan Kumar, Tapas Kumar Chowdhuri and Raghunath Sadhukan

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Abstract

An experiment entitled “Studies on the effect of potting media on growth of *Chlorophytum comosum* ornamental foliage plant”. This study aims to discover the optimal media combination for spider plant 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 treatments (media 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 T₁ Soil + Sand + FYM (2:1:1) significantly improved vegetative attributes of *Chlorophytum comosum*.

Keywords: *Chlorophytum comosum*, pot culture, media compositions, growth parameters

Introduction

Chlorophytum comosum (Spider plant) is a popular ornamental indoor plant valued for its attractive appearance, ease of maintenance, and rapid growth. The plant forms a graceful cascade of long, narrow green leaves with distinctive white stripes that arch elegantly over the edges of containers. It also produces delicate white flowers on slender stalks, enhancing its ornamental appeal. It has become widely naturalized in many parts of the world, including Western Australia. Commonly known as the spider plant or airplane plant, it is one of the most widely cultivated foliage plants for indoor decoration and landscaping purposes.

The growing substrate plays a vital role in influencing the growth, compactness, and flowering of potted plants. According to Nichols and Savidov (2009) [5], soil has gradually become less preferred as a growing medium over the past five decades due to its limitations, while coir (cocopeat) has gained widespread acceptance and has been extensively used as a potting medium for more than a decade because of its favorable physical and chemical properties.

Sand is considered an excellent component of potting media as it improves aeration and drainage, thereby providing adequate air space for root growth. Its neutral pH makes it suitable for the cultivation of a wide range of plants. In addition, the relatively higher weight of sand offers better anchorage and support to plants in containers. It is also inexpensive and readily available, making it a commonly used ingredient in potting mixtures.

Farmyard manure (FYM), on the other hand, is a valuable source of essential plant nutrients. Although it is required in larger quantities compared to inorganic fertilizers, it is more economical and provides a sustained release of nutrients over a longer period (Makinde *et al.*, 2007) [3]. Furthermore, FYM enhances microbial activity in the growing medium, which improves nutrient availability and increases soil fertility (Ayuso *et al.*, 1996) [1].

Vermicompost does not have any adverse effect on soil, plant and environment. It improves soil aeration and structure thereby reducing soil compaction. It improves water retention capacity of soil because of its high organic matter content. It also promotes better root growth and nutrient absorption and improves nutrient status of soil, both macro-nutrients and micro-nutrients.

Cocopeat is increasingly being accepted as an ideal growing medium due to its excellent aeration, lightweight nature, durability, and high water-holding capacity. Soilless growing media have gained widespread popularity among commercial growers because they offer uniformity, superior aeration, reproducibility, and low bulk density, which significantly reduce the costs associated with transportation, handling, and maintenance of both the growing medium and finished plants (Nazari *et al.*, 2011) [4].

The present investigation was undertaken to evaluate the effect of different potting media and their combinations on the growth performance of Spider Plant. Various growing media, including soil, sand, cocopeat, vermicompost and farmyard manure were used in different proportions. The primary objective of the study was to assess the response of spider plant to different potting media combinations and to identify the most suitable medium for enhancing ornamental plant growth.

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. Ten 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.

Results and Discussion

Plant height

The highest plant height (38 cm) was observed in T₇ (cocopeat + sand + FYM + vermicompost, 2:1:1:0.5), which was followed by T₄ (cocopeat) recording 35 cm and T₁ (soil + sand + FYM, 2:1:1) recording 34 cm, as shown in Table. The growing substrate plays a vital role in supplying essential nutrients, water, and adequate support for plant growth, thereby contributing to maximum plant height. The deficiency or inadequate availability of any essential nutrient in the growing medium can adversely affect plant growth and development. The results of the present study indicated that media containing FYM, Vermicompost and cocopeat promoted greater plant height compared to other treatments, which may be attributed to their superior nutrient content and favourable physical properties. These findings are in agreement with the results reported by Fred *et al.* (1997) [2].

No. of leaves per plant

Significantly variability was observed in growth of leaf parameters that were leaf length, leaf width under different combinations of potting media present in table. Among the different media compositions, treatment T₁ recorded a significantly higher number of leaves per plant compared to the other treatments. The maximum number of leaves per plant (140) was observed in T₁, followed by T₇ (110) and T₃ (108). The minimum number of leaves per plant (52) was recorded in T₅. The increased leaf production in T₁ may be attributed to the higher nutrient availability and improved physical properties provided by cocopeat, vermicompost, sand and FYM. These organic substrates enhance aeration and moisture retention, thereby promoting better root growth and nutrient uptake. Furthermore, improved aeration may stimulate nitrogen mineralization, leading to enhanced vegetative growth and leaf development (Succop and Newman, 2004) [6].

Effect of various combinations of potting media on the plant height, Number of leaves, leaf length, leaf width and plant spread

S. No.	Treatment Name	Plant height (cm)	No. of leaves plant ⁻¹	Leaf length (cm)	Leaf width (cm)	Plant spread (cm)
1	Soil + sand + FYM (2:1:1)	34	140	33	0.7	50 x 46
2	Soil + sand + vermicompost (2:1:1)	25	78	24	0.6	45x38
3	Soil + sand + FYM + vermicompost (2:1:1.0:0.5)	28	108	28	0.8	30x30
4	Cocopeat only	35	66	33	0.6	37x39
5	Cocopeat + sand + FYM (2:1:1)	25	52	21	0.6	58x60
6	Cocopeat + sand + vermicompost (2:1:1)	26	64	24	0.5	43x37
7	Cocopeat + sand + FYM + vermicompost (2:1:1.0:0.5)	38	110	33	0.6	45x46

Leaf length (cm)

Leaf length (cm) exhibited significant variation among different growing media compositions. Maximum leaf length (33 cm) was observed in plants grown in media composition T₁ which is on par with media T₄ and T₇ recording 33 cm and 33 cm, respectively. However, minimum leaf length (21 cm) was recorded in spider plants raised in treatment T₅. The positive impacts of the growing medium components may be responsible for the plants increased vegetative development. Cocopeat, vermicompost, and FYM made up the medium, which enhanced the substrate's texture and prevented compaction, improving its physical characteristics. Cocopeat's high porosity enhanced the medium's ability to retain water, guaranteeing the plants

a steady supply of moisture. Additionally, cocopeat's high cation exchange capacity (CEC) allowed for effective nutrient retention and progressive release in accordance with plant needs. Additionally, cocopeat has significant concentrations of vital minerals that support improved plant growth and development, including nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg).

The addition of farmyard manure (FYM), a rich source of organic matter and vital plant nutrients, may be responsible for the plants enhanced vegetative development. The balanced and slow release of nutrients in easily accessible forms after decomposition may be the cause of FYM's positive effects on vegetative metrics. This promotes

improved plant growth and development by strengthening root development and facilitating effective nutrient uptake. Additionally, FYM enhances the substrate's biological and physical characteristics when mixed with other growing medium ingredients, fostering an environment that is conducive to root growth, nutrient absorption, and efficient translocation within the plant.

Plant spread

Plant spread recorded in chlorophytum plants showed significant differences among different growing media compositions. The highest plant spread (58x60 cm) was observed in plants grown in media composition T₅ followed by media T₁ and T₇ which showed plant spread of (50x46 cm) and (45x46 cm), respectively. However, minimum plant spread (30x30 cm) was recorded in plant raised in media composition T₃. The enhanced vegetative growth observed in the plants may be attributed to the beneficial effects of the growing medium components. The medium consisted of cocopeat, vermicompost and FYM which improved the physical properties of the substrate by enhancing its texture and preventing compaction. Due to its highly porous nature, cocopeat increased the water-holding capacity of the medium, ensuring a continuous supply of moisture to the plants. Furthermore, the high cation exchange capacity (CEC) of cocopeat facilitated efficient nutrient retention and gradual release according to plant requirements. Cocopeat also contains appreciable amounts of essential nutrients such as nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg), which contribute to better plant growth and development.

The improved vegetative growth observed in the plants may be attributed to the incorporation of farmyard manure (FYM), which is a rich source of organic matter and essential plant nutrients. The beneficial effects of FYM on vegetative parameters could be due to the balanced and gradual release of nutrients in readily available forms following decomposition. This enhances root growth and facilitates efficient nutrient uptake, thereby promoting better plant growth and development. Furthermore, when combined with other components of the growing medium, FYM improves the physical and biological properties of the substrate, creating a favorable environment for root proliferation, nutrient absorption, and effective translocation within the plant.

Conclusion

The above recorded observations showed that Chlorophytum performed best under soil + sand + FYM (2:1:1) improvement of vegetative parameters of the plant that is plant height (cm), plant spread (cm), number of leaves, leaf length (cm) as well as for the attractive foliage of plants.

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