

EFFECT OF DIFFERENT POTTING MEDIA ON PLANT GROWTH AND SPIKE YIELD OF *DENDROBIUM*

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Abstract

An experiment was carried out at the orchidarium of the Department of Horticulture, SHIATS, Allahabad under shade net house during August 2011-April 2012. The experiment was laid out in completely randomized design (CRD) with 12 treatments, each treatment replicated thrice. The effect of 12 different potting media *i.e.*, rice husk, wheat husk, tile bits, poultry manure, vermi-compost, charcoal, coconut dust, sugarcane trashes, coconut fibers and leaf mould, gravel jelly, and brick pieces was studied. It was observed that treatment of tile bits pieces found to be the best potting medium for growing *Dendrobium* orchid and produced the best vegetative growth, spike yield besides giving the best benefit-cost ratio as compared to other treatments.

Introduction

DENDROBIUM, THE doyen among all orchids is aptly called as the *Angel Flowers*. The orchids occupy the prime position among all the flowering plants valued for cut flower production and as potted plants. These plants differ greatly from each other in terms of growth habits, form, size, shape and colour. They are epiphytic, terrestrial, saprophytic or lithophytic in nature. One characteristic feature of all orchids is the presence of velamen tissue around the true root for water and mineral absorption. They are grown all over the world, ranging from tropic to temperate regions and require annual rainfall as 1100 cm with humidity more than 70%. The materials used for growing orchids are entirely different from those used for other plants. An ideal potting medium should, provide firm anchorage, good aeration, retard disease and pathogenic factors; keep the plant free from rotting; and provide a bit of nutrient, eco-friendly and readily available. Therefore, the present study was aimed to investigate the effect of potting media on growth and spike yield of *Dendrobium* orchid.

Materials and Methods

The present study was conducted at the orchidarium of the Department of Horticulture, SHIATS, Allahabad, (U.P.), in a shade net house in perforated 12 inch earthen pots (the pots were placed over 5cm sand surface) in completely randomized design (CRD). The epiphytic *Dendrobium* hybrids *i.e.*, Sonia hisakul and Emma white were grown in different pots containing different potting media *i.e.*, rice husk, wheat husk, tile bits, poultry manure, vermi-compost, charcoal, coconut dust, sugarcane trashes, coconut fibers and leaf mould,

gravel jelly, and brick pieces. The potting media was filled in the 12 inch diameter pots. The plant to be potted was placed on this mound with the roots spread outwards and downwards along the top of this mound. With the help of hands, the space between the root and walls of the pot was filled with more medium excluding the pseudobulb, till the pot was filled to an inch from the rim of the pot. Staking is done with bamboo stick to give support to the plant and the flower spike. Watering was done early in the morning, as per requirement. The recommended water soluble fertilizer dose of 19: 19:19 (N:P:K) was applied through fertigation at 3gl⁻¹ of water twice weekly and micronutrients were sprayed at monthly intervals. (Tables 1-2; Figs.1,2).

Results and Discussion

Different potting media significantly affected the plant height at various stages of growth. Earlier Bhattacharjee (1982) explained the influence of different potting substrates on growth and flowering of *Rhynchostylis gigantea* and subsequently Baker and Baker (1996, 1997) studied their effects on *Dendrobium nobile* and *D. bigibbum* species. Grove and Allikas (1998) explained the properties of potting materials for orchids. More recently, Srinivasulu *et al.* (2017) studies comparative effect of different potting media on vegetative and reproductive growth of *Dendrobium* orchid var. Sonia-17. Presently, the maximum plant height was recorded in T₃ (plant potted in tile bits) followed by T₁ (rice husk). Similar observations were earlier made by Arora and Mukherjee (1983) indicating that increase in plant height in tile bits was because of better drainage, less rooting and disease and better aeration of roots. The experimental findings showed that the maximum

Table 1. Effect of different potting media on different characters on *Dendrobium* orchids.

| Treatment | Potting medium | Total number of spikes / plant | Number of florets/spike | Spike length (cm) | Longevity of spike (Days) |
|-----------------|-------------------|--------------------------------|-------------------------|-------------------|---------------------------|
| T ₁ | Rice husk | 4.33 | 11.38 | 36.00 | 44.33 |
| T ₂ | Wheat husk | 3.50 | 10.77 | 32.00 | 41.00 |
| T ₃ | Tile bits | 4.44 | 11.49 | 37.00 | 45.50 |
| T ₄ | Poultry manure | 2.33 | 9.66 | 25.50 | 34.83 |
| T ₅ | Vermi-compost | 2.61 | 9.77 | 26.50 | 35.66 |
| T ₆ | Charcoal | 2.00 | 9.50 | 24.33 | 33.50 |
| T ₇ | Coconut dust | 2.72 | 9.88 | 27.50 | 37.00 |
| T ₈ | Sugarcane trashes | 3.66 | 10.88 | 33.83 | 42.00 |
| T ₉ | Coconut fibres | 3.66 | 11.11 | 35.00 | 43.00 |
| T ₁₀ | Leaf mould | 3.83 | 11.22 | 35.50 | 43.33 |
| T ₁₁ | Bricks pieces | 2.87 | 10.66 | 30.16 | 38.83 |
| T ₁₂ | Gravel jelly | 2.76 | 10.27 | 28.33 | 37.83 |
| | F - test | S | S | S | N.S. |
| | S. Ed (±) | 0.05 | 0.04 | 0.15 | 0.15 |
| | C.D. at 5% | 0.11 | 0.09 | 0.31 | 0.31 |

Table 2. Effect of different potting media on different floral characters on *Dendrobium* orchids.

| Treatment | Potting medium | Plant height (cm) | Number of leaves/plant | Leaf area | Number of new shoot /plant | Shoot girth (cm) | Root length | Number of roots/plant (cm) |
|-----------------|-------------------|-------------------|------------------------|-----------|----------------------------|------------------|-------------|----------------------------|
| T ₁ | Rice husk | 30.68 | 10.83 | 39.10 | 4.66 | 3.02 | 17.45 | 23.16 |
| T ₂ | Wheat husk | 28.27 | 9.72 | 32.85 | 3.50 | 2.57 | 14.53 | 21.33 |
| T ₃ | Tile bits | 33.72 | 10.94 | 40.33 | 5.00 | 3.22 | 17.60 | 23.50 |
| T ₄ | Poultry manure | 27.57 | 10.61 | 24.20 | 2.00 | 2.19 | 10.91 | 17.83 |
| T ₅ | Vermi-compost | 27.31 | 8.22 | 26.26 | 2.16 | 2.24 | 11.69 | 18.33 |
| T ₆ | Charcoal | 25.15 | 8.50 | 26.66 | 1.83 | 2.02 | 10.23 | 17.00 |
| T ₇ | Coconut dust | 27.61 | 8.83 | 28.08 | 2.50 | 2.31 | 12.03 | 20.16 |
| T ₈ | Sugarcane trashes | 29.75 | 10.16 | 33.75 | 3.50 | 2.57 | 15.32 | 22.00 |
| T ₉ | Coconut fibres | 30.68 | 10.27 | 35.56 | 4.00 | 2.86 | 15.82 | 22.33 |
| T ₁₀ | Leaf mould | 28.22 | 10.72 | 36.68 | 4.33 | 2.95 | 16.77 | 22.83 |
| T ₁₁ | Bricks pieces | 27.66 | 9.61 | 34.30 | 3.16 | 2.44 | 13.53 | 21.00 |
| T ₁₂ | Gravel jelly | 29.75 | 9.27 | 29.66 | 2.83 | 2.39 | 12.67 | 20.00 |
| | F - test | S | S | S | S | S | S | S |
| | S. Ed (±) | 0.38 | 0.04 | 0.27 | 0.11 | 0.18 | 0.06 | 0.13 |
| | C.D. at 5% | 0.77 | 0.09 | 0.56 | 0.23 | 0.37 | 0.13 | 0.27 |

number of leaves was obtained in T₃ followed by T₁. Rice husk promoted higher shoot growth due to better growing environment for the plant, which probably resulted in enhancing the leaf population per plant

(Dematte, 1996). T₃ i.e., tile bits potted plant, showed best values for other growth parameters like total number of shoots/plant, number of new shoots per plant and root length (Evers and Laurie, 1940). Total number

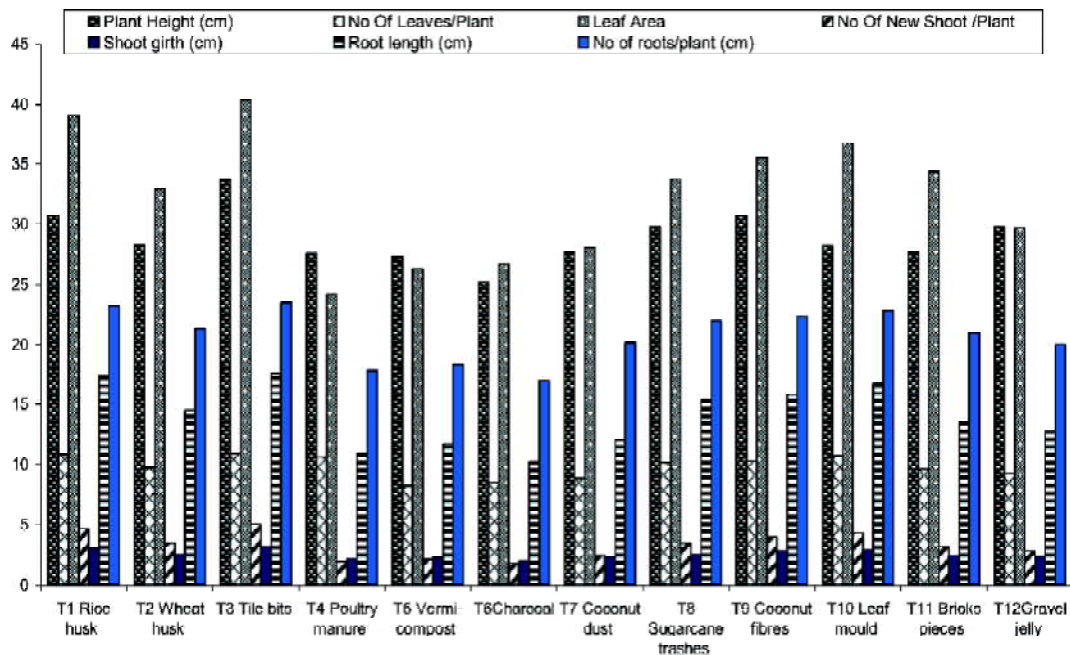


Fig. 1. Effect of different potting media on growth and spike yield of *Dendrobium* orchid.

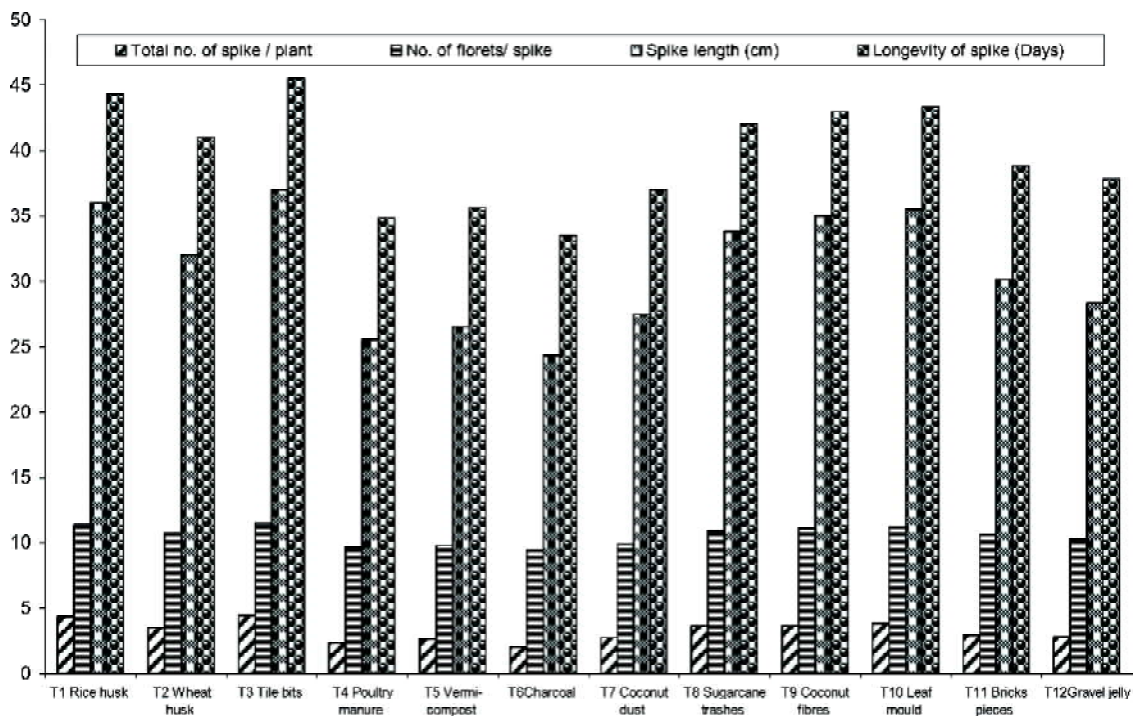


Fig. 2. Effect of different potting media on different floral characters in *Dendrobium* orchid.

of spikes per plant and average spike length, were also found to be the best in T_3 (tile bits potted plants); followed by T_1 (rice husk potted ones). Leaf mould potted plant i.e. T_{10} treatment had the lowest values of these characters (Sheehan, 1961). Flowering character like number of florets per spike, and longevity of spike were

also observed to the best in T_3 , followed by T_1 . There was a general sequence that was observed in order of preference for the potting by the presently investigated orchids i.e., $T_3, T_1, T_{10}, T_9, T_8, T_2, T_{11}, T_{12}, T_7, T_5, T_4$ and T_6 . Srinivasulu *et al.* (2017) indicated that for overall growth of plants, medium comprising charcoal+peanut,

shell+maize, rind pieces, and charcoal+stone pebbles+coconut husk was found in general, the best for cultivation of *Dendrobium*. Therefore, much needs to be learnt about the effects of varied potting media on the growth and flowering of different orchid species.

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