



P-ISSN: 2349-8528  
E-ISSN: 2321-4902  
IJCS 2019; 7(5): 50-56  
© 2019 IJCS  
Received: 10-07-2019  
Accepted: 12-08-2019

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## Standardization of different potting media on vegetative growth and flowering of *Dendrobium* orchid cv. Sonia 17 under shade net conditions in high altitude tribal zone of Andhra Pradesh

**M Sanghamitra, J Dilip Babu, BVK Bhagavan, V Siva Kumar, Dr. Salomi Suneetha and K Uma Krishna**

### Abstract

The present investigation entitled “Standardization of different potting media on vegetative growth and flowering of *Dendrobium* orchid cv. sonia 17 under shade net conditions in high altitude tribal zone of Andhra Pradesh” was carried out at Horticulture Research station, Chintapalli, Visakhapatnam district of Andhra Pradesh during two consecutive years of 2016-17 and 2017-18. The experiment was laid out in a completely randomized design with 10 treatments and each treatment replicated thrice. The data recorded on various parameters viz., vegetative growth, flowering and were statistically analyzed. Significant differences were observed among different potting media on various vegetative growth parameters in *Dendrobium* orchid cv. Sonia 17. Among all the treatments, Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) showed significantly the best results with all the vegetative growth parameters viz., plant height (29.66 cm), number of leaves per plant (11.75), number of shoots per plant (9.04), shoot girth (3.63 cm), leaf length (11.96 cm) and leaf breadth (3.48 cm). Significant differences were observed among different potting media on various flowering parameters in *Dendrobium* orchids cv. Sonia 17. Among all the treatments, Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) showed significantly the best results with respect to days taken to spike emergence (152.95 days), days taken to spike development (26.48 days), spike length (46.40 cm), spike girth (1.74 cm), spike weight (17.33 g), number of flowers per spike (8.06), flower diameter (6.43 cm), number of spikes per plant (3.58).

**Keywords:** *Dendrobium*, potting media, vegetative growth, flowering

### Introduction

Orchids are the most beautiful flowers in God’s creation and have conquered the cut flower industry all over the world during the last few decades. Orchid cut flowers have emerged as leader in the International market and have immensely contributed to the economy of several developed and developing countries. They are valued for cut flower production and as potted plant in commercial floriculture owing to the wide range of colours, shapes, sizes and fragrance they display. Orchids are excellent for garden and can be grown in beds, pots, baskets, split hollows of bamboo pieces etc. They are marketed globally as cut flowers for making corsages, floral arrangements and bouquets. They are also suitable for interior decoration and remain fresh for many days. They comprise the largest family (Orchidaceae) of flowering plants with 25,000 to 35,000 species belonging to 600-800 genera (Chowdhery, 2001) [3].

*Dendrobium* is the second largest orchid genera consisting of more than 16,000 species (Puchooa, 2004) [13]. Countries including Thailand, Taiwan, China, Phillipines, Germany, United States, Japan and India are major producers of *Dendrobium* orchids. Most *Dendrobium* species are epiphytic, sympodial orchids and are from subtropical and tropical regions and is a popular genus for cut flower production. Many growers in the states of Karnataka, Kerela, Tamilnadu and Andhra Pradesh are cultivating *Dendrobium* on a commercial scale. The flower spikes of *Dendrobium* are extremely beautiful, medium sized with flowers numbering between 5-20, in colours such as white, mauve, pink, red, blue, purple, yellow and are highly popular in the National and International market. Orchids are used in Indigenous system of medicine, particularly in Ayurveda.

At present cultivation of orchids, particularly *Dendrobium* hybrids is gaining momentum in India. It has got an excellent market potential in the floriculture industry. Despite the fact that India has diversified climate, low cost of labour and progressive farming technology, the orchid industry is still in an infant stage for commercial cultivation. *Dendrobium* being an epiphytic in nature spread their roots over the branches of trees exposing them fully, therefore, the type of media used for growing epiphytic orchids should provide a surface over which the plants can cling to. A good mixture of media is useful in terms of all vegetative and flowering parameters. An ideal growing media facilitates proper aeration, adequate drainage and good anchorage to the plant and should provide healthy environment for roots. It should be inert, porous and resistant to organic decomposition. It should be cheap and easily available (Bose and Bhattacharjee, 1980) [2]. The vigorous and healthy root system in epiphytic orchids was first step towards ensuring maximum growth. Hence, selection of ideal rooting media provides a high degree of success for profuse root growth. In this concern, the present investigation was undertaken to standardize the potting media for *Dendrobium* Orchids cv. Sonia 17 for good vegetative growth and flowering.

### Material and Methods

The experimental site was located at the Horticulture Research Station, Chintapalli (Humid sub tropical zone), Visakhapatnam District, Andhra Pradesh and experiment was carried out during two consecutive years of 2016-17 and 2017-18. Eighteen months old tissue cultured plants which were originally imported from Thailand were used as planting material for conducting experiment. Sonia-17 is one of the popular hybrids of the genus. It is a cross between *Dendrobium caesar* × *Dendrobium tomiedrake*. The plant shows sympodial (upright) growth with club shaped pseudobulbs. Leaves are bright green, broad and acute. Flowers are white and purple coloured, sepals are creamy white with purple markings, petals purple in colour. Shade net house was used for growing orchid under partially controlled atmosphere and environment by reducing light intensity and heat radiation during day time. Plants were potted and placed on the benches of 40 m length, 18 cm width and 1 m height.

Planting was taken up in plastic pots of size 16 cm diameter with 10 drainage holes each of 2 cm diameter (to drain the excess water and for free movement of air). Orchids require a suitable potting medium for growth and development and it varies with type of orchid and the environmental conditions (Kang, 1972 and Fitch, 1981 [9, 7] Growing medium for *Dendrobium* should be moist but never be soggy (Rajeevan *et al.*, 2008) [14]. After planting, the potting media were immediately irrigated thoroughly to maintain the optimum moisture condition. During vegetative phase N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O at the ratio of 3:1:1 and during blooming phase at the ratio of 1:2:2 (0.2% concentration) were provided weekly once. Nutrient combinations were made using ammonium nitrate, orthophosphoric acid and potassium nitrate. The commercially available water soluble fertilizers (19-19-19, 13-0-45) of different grades were also used as source for nutrients. Micronutrients were sprayed monthly once. Calcium nitrate and Magnesium sulphate @ 0.1% was given once in a month.

Completely randomized design was set with three replications having fifteen plants in each replication and each replication contains ten different treatments. The data recorded on various vegetative parameters *viz.*, plant height, number of

leaves per plant, number of shoots per plant, shoot girth, leaf length and leaf breadth and flowering parameters *viz.*, days taken to spike emergence, days taken to spike development, spike length, spike girth, spike weight, number of flowers per spike, flower diameter, number of spikes per plant and were statistically analyzed.

## Results and Discussion

### Vegetative parameters

**Plant height:** The data pertaining to the effect of different potting media on plant height of *Dendrobium* orchid cv. Sonia 17 is presented in Table no.1. The data was recorded at two months interval from the date of planting to harvesting for two consecutive years 2016-17 and 2017-18. The plant height was non significantly influenced by different potting media at 2 months after transplanting and 4 months after transplanting in *Dendrobium* orchid cv. Sonia 17.

At 6, 8, 10, 12, 14, 16 months after transplanting, among all the treatments maximum plant height was noted with Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1). The minimum plant height was observed in Paddy husk + Brickpieces + Gravel (2:1:1).

At 18 months after transplanting, among all the treatments maximum plant height was noted with Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) (29.66 cm) which was on par with (T<sub>4</sub>) Coconut husk chips + Brickpieces + Gravel (2:1:1) (28.63 cm). The minimum plant height was recorded in Paddy husk + Brickpieces + Gravel (2:1:1) (22.20 cm).

**Number of leaves and Number of shoots:** The data pertaining to the effect of different potting media on number of leaves per plant and number of shoots per plant of *Dendrobium* orchid cv. Sonia 17 is presented in Table no.2. Significant differences were observed in number of leaves and number of shoots at the end of vegetative stage.

Among all the treatments Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) has recorded significantly the highest number of leaves per plant (11.75) and number of shoots per plant (9.04) while, Paddy husk + Brickpieces + Gravel (2:1:1) recorded significantly the lowest number of leaves per plant (6.43) and number of shoots per plant (5.38) which was on par with *ie.*, Coconut husk (5.65).

**Shoot girth:** The data pertaining to the effect of different potting media on shoot girth of *Dendrobium* orchid cv. Sonia 17 is presented in Table no.2. Significant differences were observed in shoot girth at the end of vegetative stage.

Among all the treatments Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) has recorded significantly the maximum shoot girth (3.63 cm) while, Paddy husk + Brickpieces + Gravel (2:1:1) recorded significantly the minimum shoot girth (1.84 cm).

**Leaf length and Leaf breadth:** The data pertaining to the effect of different potting media on leaf length and leaf breadth of *Dendrobium* orchid cv. Sonia 17 is presented in Table no.3. Significant differences were observed in leaf length at the end of vegetative stage.

Treatments had marked influence on leaf length and leaf breadth and maximum leaf length (11.96 cm) and leaf breadth (3.48 cm) was noticed in Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) (11.96 cm) while, Paddy husk + Brickpieces + Gravel (2:1:1) recorded minimum leaf length (6.85 cm) and leaf breadth (2.11 cm).

The combination of Coconut husk chips + Brickpieces + Charcoal + Gravel in the ratio of 2:1:1:1 as growing media significantly increased the vegetative parameters like plant height, number of leaves per plant, number of shoots per plant, shoot girth, leaf length and leaf breadth. This might be due to the improved aeration, water holding capacity and chemical properties of the growing media (Savithri and Khan, 1994) [16].

Coconut husk contains relatively high amounts of phosphorus and potassium (Noguera, 2000) [12] which helped in better root growth. Root growth is very important in orchids, as they are epiphytes and absorbs nutrients and moisture from atmosphere which in turn improves the vegetative growth of plant. Coconut husk also provides better anchorage of pseudobulb, better moisture retention capacity in growing media, provides good aeration to allow gaseous exchange between the roots and atmosphere outside, prevents heat and supply essential nutrients. The favorable physico-chemical properties like low bulk density, high porosity, lower pH value and higher retention of nutrients of coconut husk media supported proper growth of plants. Bhattacharjee (1985) [1] also opined that brick pieces not only provides good support, but also holds enough moisture in the pore space.

Charcoal filters the impurities, absorbs dissolved salts that could damage the root system of the plant and allow flow of air through potting mix, prevent decay and endure in potting mix for several years (Gohil, 2018) [8] and also retains moisture, nutrients for growth of plants and delays senescence of the leaves when used in combination with other growing media (Santiago and Santiago, 1989) [15]. Charcoal holds fertilizer while giving nutrient solution to the growing media and on subsequent watering it releases nutrients slowly to the growing plant (Devadas *et al.*, 2008) [4]. Gravel is an inert material which does not decay and remain intact in the potting media and thus reduces the risk of root decay resulting from anaerobic condition. All these components in the media improved initial vigour of the plant which would have helped in better production of frame work for better metabolic activities especially with regard to production of more photo-assimilates and increased the vegetative growth parameters like plant height, number of leaves, number of shoots, shoot girth, leaf length and leaf breadth.

Significantly the lowest vegetative parameters were recorded in Paddy husk + Brickpieces + Gravel (2:1:1) potting media, which might be due to the lower nitrogen content (less than 0.24%) of paddy husk and depletion of nutrients at a faster rate when compared to other media resulted in poor vegetative growth as reported by Kumar *et al.* (2012) [10] in rice.

### Flowering parameters

**Days taken to spike emergence:** The data pertaining to the effect of different potting media on days taken to spike emergence of *Dendrobium* orchid cv. Sonia 17 is presented in Table no. 4. Significant differences were noticed in days taken to spike emergence with different potting media in *Dendrobium* orchid cv. Sonia 17.

Data revealed that mixture of Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) as potting media significantly recorded minimum number of days taken to spike emergence (152.95 days) which was on par with Coconut husk chips + Brickpieces + Gravel (2:1:1) (155.37 days), Coconut husk chips + Charcoal + Gravel (2:1:1) (153.42 days) and Cocopeat + Charcoal + Gravel (2:1:1) (160.30 days) and plants grown in potting media mixture of

Paddy husk + Brickpieces + Gravel (2:1:1) recorded significantly the maximum number of days taken to spike emergence (172.62 days) which was on par with Coconut husk (170.62 days), Paddy husk + Charcoal + Gravel (2:1:1) (169.60 days), Paddy husk + Brick pieces + Charcoal + Gravel (2:1:1:1) (166.35 days), Cocopeat + Brick pieces + Gravel (2:1:1) (163.23 days) and Cocopeat + Brick pieces + Charcoal + Gravel (2:1:1:1) (163.08 days).

**Days taken to spike development:** The data pertaining to the effect of different potting media on days taken to spike development of *Dendrobium* orchid cv. Sonia 17 is presented in Table no.4. Significant differences were observed in days taken to spike development with different potting media in *Dendrobium* orchid cv. Sonia 17.

Among all the treatments Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) has recorded significantly the minimum number of days taken to spike development (26.48 days) which was on par with Coconut husk chips + Charcoal + Gravel (2:1:1) (27.57 days), Coconut husk chips + Brickpieces + Gravel (2:1:1) (27.18 days), Paddy husk + Brick pieces + Charcoal + Gravel (2:1:1:1) (28.40 days), Cocopeat + Brick pieces + Gravel (2:1:1) (27.75 days), Cocopeat + Charcoal + Gravel (2:1:1) (28.47 days) and Cocopeat + brick pieces + Charcoal + Gravel (2:1:1:1) (28.00 days) while, Paddy husk + Brickpieces + Gravel (2:1:1) recorded significantly the maximum number of days taken to spike development (31.88 days) which was on par with Coconut husk (29.90 days) and Paddy husk + Charcoal + Gravel (2:1:1) (29.33 days).

**Spike length:** The data pertaining to the effect of different potting media on spike length of *Dendrobium* orchid cv. Sonia 17 is presented in Table no. 5. Significant differences were noticed in length of spike at the peak flowering stage in *Dendrobium* orchid cv. Sonia 17.

Among different potting media superior spike length was noticed when plants grown in Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) (46.40 cm). The minimum spike length was recorded in Paddy husk + Brickpieces + Gravel (2:1:1) (33.94 cm).

**Spike girth:** The data pertaining to the effect of different potting media on spike girth of *Dendrobium* orchid cv. Sonia 17 is presented in Table no.5. Significant differences were observed in spike girth at the peak flowering stage.

Perusal of data clearly indicated that plants grown in combination of Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) has recorded significantly the maximum shoot girth (1.74 cm) which was statistically on par with Coconut husk chips + Brickpieces + Gravel (2:1:1) (1.69 cm) further, lowest spike girth was obtained with potting mixture of Paddy husk + Brickpieces + Gravel (2:1:1) (1.09 cm).

**Spike weight:** The data pertaining to the effect of different potting media on spike weight of *Dendrobium* orchid cv. Sonia 17 is presented in Table no.5. Spike weight differed significantly for different potting media at peak flowering stage.

Among all the treatments Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) has recorded significantly the maximum spike weight (17.33 g) while, Paddy husk + Brickpieces + Gravel (2:1:1) recorded significantly the minimum spike weight (12.28 g).

**Number of flowers per spike:** The data pertaining to the effect of different potting media on number of flowers per spike of *Dendrobium* orchid cv. Sonia 17 is presented in Table no. 6. Significant differences were observed in number of flowers per spike at the peak flowering stage.

Treatment had marked influence on number of flowers per spike and among all the treatments Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) has recorded significantly the maximum number of flowers per spike (8.06) which was statistically on par with Coconut husk chips + Brickpieces + Gravel (2:1:1) (7.81) further, Paddy husk + Brickpieces + Gravel (2:1:1) recorded significantly the minimum number of flowers per spike (5.04).

### Diameter of flower

The data pertaining to the effect of different potting media on diameter of flower of *Dendrobium* orchid cv. Sonia 17 is presented in Table no.6. Significant differences were noticed in flower diameter at the peak flowering stage in *Dendrobium* orchid cv. Sonia 17.

Among all the treatments, plant grown in potting mixture of Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) has recorded significantly the bigger diameter of flower (6.43 cm) while, Paddy husk + Brickpieces + Gravel (2:1:1) recorded significantly the smaller diameter of flower (3.98 cm).

**Table 1:** Effect of different potting media on plant height (cm) of *Dendrobium* Orchids cv. Sonia 17

Treatments	Plant height (cm)									
	2MAT	4MAT	6MAT	8MAT	10MAT	12MAT	14MAT	16MAT	18MAT	Mean
T <sub>1</sub>	18.33	18.63	18.66	19.43	20.83	21.33	21.83	21.86	22.20	20.34
T <sub>2</sub>	19.30	19.86	20.53	21.63	23.03	23.53	23.96	24.23	24.46	22.28
T <sub>3</sub>	17.53	18.90	20.86	21.96	23.46	23.86	24.33	24.39	24.76	22.22
T <sub>4</sub>	19.36	20.93	22.26	23.33	24.80	25.23	25.70	28.00	28.63	24.24
T <sub>5</sub>	20.20	20.93	22.20	23.30	24.53	25.20	25.66	26.36	27.16	23.94
T <sub>6</sub>	19.80	22.16	23.96	25.06	26.50	26.96	27.46	28.73	29.66	25.58
T <sub>7</sub>	18.76	19.56	20.66	21.76	23.16	23.66	24.16	25.30	26.20	22.58
T <sub>8</sub>	18.70	19.40	21.16	22.26	23.66	24.16	24.63	24.76	25.93	22.74
T <sub>9</sub>	17.90	18.80	21.23	22.30	23.73	24.23	24.66	24.90	26.23	22.66
T <sub>10</sub>	17.46	19.46	19.83	20.26	21.63	22.16	22.66	24.50	24.66	21.40
Mean	19.16	19.85	21.13	22.12	23.53	24.03	24.50	24.63	25.69	22.79
S.Em±	0.95	0.86	0.44	0.48	0.47	0.48	0.47	0.71	0.65	0.61
CD at 5%	NS	NS	1.31	1.42	1.40	1.43	1.40	2.10	1.94	1.57

T<sub>1</sub>: Paddy husk + Brickpieces + Gravel (2:1:1)

T<sub>2</sub>: Paddy husk + Charcoal + Gravel (2:1:1)

T<sub>3</sub>: Paddy husk + Brickpieces + Charcoal + Gravel (2:1:1:1)

T<sub>4</sub>: Coconut husk chips + Brickpieces + Gravel (2:1:1)

T<sub>5</sub>: Coconut husk chips + Charcoal + Gravel (2:1:1)

T<sub>6</sub>: Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1)

T<sub>7</sub>: Cocopeat + Brickpieces + Gravel (2:1:1)

T<sub>8</sub>: Cocopeat + Charcoal + Gravel (2:1:1)

T<sub>9</sub>: Cocopeat + Brickpieces + Charcoal + Gravel (2:1:1:1)

T<sub>10</sub>: Coconut husk (Control)

**Table 2:** Effect of different potting media on Number of leaves per plant, Number of shoots per plant and shoot girth (cm) of *Dendrobium* Orchids cv. Sonia 17

Treatments	Number of leaves per plant	Number of shoots per plant	Shoot girth (cm)
T <sub>1</sub> : Paddy husk + Brickpieces + Gravel (2:1:1)	6.43	5.38	1.84
T <sub>2</sub> : Paddy husk + Charcoal + Gravel (2:1:1)	7.73	5.95	2.25
T <sub>3</sub> : Paddy husk + Brickpieces + Charcoal + Gravel (2:1:1:1)	8.21	6.35	2.43
T <sub>4</sub> : Coconut husk chips + Brickpieces + Gravel (2:1:1)	11.04	8.46	3.30
T <sub>5</sub> : Coconut husk chips + Charcoal + Gravel (2:1:1)	10.06	7.75	3.18
T <sub>6</sub> : Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1)	11.75	9.04	3.63
T <sub>7</sub> : Cocopeat + Brickpieces + Gravel (2:1:1)	8.50	6.74	2.70
T <sub>8</sub> : Cocopeat + Charcoal + Gravel (2:1:1)	9.06	7.44	2.90
T <sub>9</sub> : Cocopeat + Brickpieces + Charcoal + Gravel (2:1:1:1)	9.40	7.49	3.03
T <sub>10</sub> : Coconut husk (Control)	7.29	5.65	2.06
Mean	8.94	7.02	2.73
S.Em±	0.16	0.13	0.05
CD at 5%	0.47	0.39	0.15

**Table 3:** Effect of different potting media on leaf length (cm) and leaf breadth (cm) of *Dendrobium* Orchids cv. Sonia 17

Treatments	Leaf length (cm)	Leaf breadth (cm)
T <sub>1</sub> : Paddy husk + Brickpieces + Gravel (2:1:1)	6.85	2.11
T <sub>2</sub> : Paddy husk + Charcoal + Gravel (2:1:1)	8.40	2.33
T <sub>3</sub> : Paddy husk + Brickpieces + Charcoal + Gravel (2:1:1:1)	8.70	2.39
T <sub>4</sub> : Coconut husk chips + Brickpieces + Gravel (2:1:1)	11.33	3.16
T <sub>5</sub> : Coconut husk chips + Charcoal + Gravel (2:1:1)	10.66	3.01
T <sub>6</sub> : Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1)	11.96	3.48
T <sub>7</sub> : Cocopeat + Brickpieces + Gravel (2:1:1)	9.18	2.49
T <sub>8</sub> : Cocopeat + Charcoal + Gravel (2:1:1)	9.51	2.56
T <sub>9</sub> : Cocopeat + Brickpieces + Charcoal + Gravel (2:1:1:1)	10.03	2.83
T <sub>10</sub> : Coconut husk (Control)	8.15	2.26
Mean	9.47	2.66
S.Em±	0.11	0.06
CD at 5%	0.33	0.18

**Table 4:** Effect of different potting media on days taken to spike emergence and days taken to spike development of Dendrobium Orchids cv. Sonia 17

	Treatments	Days taken to spike emergence (days)	Days taken to spike development (days)
T1:	Paddy husk + Brickpieces + Gravel (2:1:1)	172.62	31.88
T2:	Paddy husk + Charcoal + Gravel (2:1:1)	169.60	29.33
T3:	Paddy husk + Brickpieces + Charcoal + Gravel (2:1:1:1)	166.35	28.40
T4:	Coconut husk chips + Brickpieces + Gravel (2:1:1)	155.37	27.18
T5:	Coconut husk chips + Charcoal + Gravel (2:1:1)	153.42	27.57
T6:	Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1)	152.95	26.48
T7:	Cocopeat + Brickpieces + Gravel (2:1:1)	163.23	27.75
T8:	Cocopeat + Charcoal + Gravel (2:1:1)	160.30	28.47
T9:	Cocopeat + Brickpieces + Charcoal + Gravel (2:1:1:1)	163.08	28.00
T10:	Coconut husk (Control)	170.62	29.90
	Mean	162.75	28.80
	SEm±	3.68	0.94
	CD at 5%	10.41	2.79

**Table 5:** Effect of different potting media on spike length (cm), spike girth (cm) and spike weight (g) of Dendrobium Orchids cv. Sonia 17

	Treatments	Spike length (cm)	Spike girth (cm)	Spike weight (cm)
T1:	Paddy husk + Brickpieces + Gravel (2:1:1)	33.94	1.09	12.28
T2:	Paddy husk + Charcoal + Gravel (2:1:1)	36.55	1.27	13.58
T3:	Paddy husk + Brickpieces + Charcoal + Gravel (2:1:1:1)	38.17	1.32	14.08
T4:	Coconut husk chips + Brickpieces + Gravel (2:1:1)	44.14	1.69	16.65
T5:	Coconut husk chips + Charcoal + Gravel (2:1:1)	43.24	1.62	16.25
T6:	Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1)	46.40	1.74	17.33
T7:	Cocopeat + Brickpieces + Gravel (2:1:1)	40.51	1.41	14.65
T8:	Cocopeat + Charcoal + Gravel (2:1:1)	40.23	1.48	14.85
T9:	Cocopeat + Brickpieces + Charcoal + Gravel (2:1:1:1)	42.07	1.58	15.62
T10:	Coconut husk (Control)	35.56	1.20	12.85
	Mean	40.08	1.44	14.81
	S.Em±	0.49	0.02	0.17
	CD at 5%	1.41	0.07	0.52

**Table 6:** Effect of different potting media on number of flowers per spike, flower diameter (cm) and number of spikes per plant of Dendrobium Orchids cv. Sonia 17

	Treatments	Number of flowers per spike	Flower diameter (cm)	Number of spikes per plant
T1:	Paddy husk + Brickpieces + Gravel (2:1:1)	5.04	3.98	1.81
T2:	Paddy husk + Charcoal + Gravel (2:1:1)	5.36	4.52	2.08
T3:	Paddy husk + Brickpieces + Charcoal + Gravel (2:1:1:1)	5.52	4.85	2.38
T4:	Coconut husk chips + Brickpieces + Gravel (2:1:1)	7.81	6.18	3.28
T5:	Coconut husk chips + Charcoal + Gravel (2:1:1)	7.11	6.07	3.08
T6:	Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1)	8.06	6.43	3.58
T7:	Cocopeat + Brickpieces + Gravel (2:1:1)	5.83	5.15	2.59
T8:	Cocopeat + Charcoal + Gravel (2:1:1)	6.25	5.55	2.76
T9:	Cocopeat + Brickpieces + Charcoal + Gravel (2:1:1:1)	6.45	5.88	2.89
T10:	Coconut husk (Control)	5.30	4.38	2.01
	Mean	6.27	5.29	2.64
	S.Em±	0.10	0.07	0.03
	CD at 5%	0.29	0.23	0.09



**T6:** Coconut husk chips + Brick pieces + Charcoal + Gravel (1:1:1:1)

**T1:** Paddy husk + Brick pieces + Gravel

**Plate 1:** Effect of different potting media on Plant height of Dendrobium Orchids cv. Sonia 17

**Number of spikes per plant:** The data pertaining to the effect of different potting media on number of spikes per plant of *Dendrobium* orchid cv. Sonia 17 is presented in Table no. 6. Number of spikes per plant differed significantly for different potting media.

Treatments had marked influence on number of spikes per plant and among all the treatments Coconut husk chips + Brickpieces + Charcoal + Gravel (2:1:1:1) has recorded significantly the maximum number of spikes per plant (3.58) while, Paddy husk + Brickpieces + Gravel (2:1:1) recorded significantly the minimum number of spikes per plant (1.81).

The plants grown in media containing Coconut husk chips + Brickpieces + Charcoal + Gravel in the ratio of 2:1:1:1 took minimum days to spike emergence and spike development. This might be due to the improved aeration which has direct effect on carbon allocation in the plant tissues which in turn increased leaf area. The availability of more photo assimilates probably reduced the time taken to spike emergence and spike development. Leffring (1975) [11] reported that in gerbera, the flower production was influenced by the total number of leaves produced per plant. Leaves, the source of carbohydrates and chlorophyll, when in greater proportion produce healthy buds and flowers.

All floral parameters like number of spikes per plant, spike length, spike girth, spike weight, number of flowers per spike and flower diameter were maximum in the growing media containing Coconut husk chips + Brickpieces + Charcoal + Gravel in the ratio of 2:1:1:1. Improved vegetative growth *i.e.* plant height, number of leaves, number of shoots and leaf area enhanced the production of carbohydrates and other photosynthetic products (source activity) and influenced the number and size of reproductive storage organs (sink capacity) as reported by Engels and Marschner (1995) [6] and ultimately influenced the yield.

The conducive root environment which would have led to proper nutrient uptake in the organic substrates may have resulted in greater accumulation of food matter leading to improved flowering parameters. Coconut husk has been

reported to contain some amount of major, secondary and micronutrients (Savithri and Khan, 1994 [16] free from any admixture of heavy metals and due to higher porosity, adequate nutrient availability and lower pH and EC in the media enhanced plant growth and flower yield.

Both physical and chemical characteristics of the growing medium exert substantial effect on growth of plants. Among the physical characteristics, aeration and water holding capacity are probably the most important factors while, among the chemical characteristics nutritional status and Salinity level have crucial role on plant development (Dewayne *et al.* 2003) [5]. Apparently, the coconut husk with charcoal had the most appropriate physico-chemical properties *viz.*, bulk density (0.05 g/cc), porosity (98.10 g/cc), pH (6.27), EC (1.22 dSm<sup>-1</sup>) and available nutrients (1.10, 0.52, 2.61 % NPK) (Sumathi, 2016) and thus gave the highest values for most of the growth parameters which ultimately produced maximum number of spikes per plant.

The lowest number of spikes was recorded in (T<sub>1</sub>) Paddy husk + Brickpieces + Gravel (2:1:1) media might be due to the fact that paddy husk contains low nitrogen and phosphorus resulting in poor root and vegetative growth that ultimately affected the reproductive growth and thus produced lesser number of spikes per plant.

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