

Original Research Article

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Studies on the Effect of Alternate Media on Growth of “*Dracaena reflexa* ‘Variegata’”

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Investigation was carried out during 2017 - 18 to study the effect of alternate media on growth of “*Dracaena reflexa* ‘Variegata’” at Department of Floriculture and Landscaping, Coimbatore. The pot experiment was laid out under shade net condition, with eight set of treatments comprising various combinations of soil, sand, vermicompost, coco peat, rice husk, biochar, perlite and microbial consortia. From the media combinations studied, the treatment involving soil (25%) + coco peat (50%) + vermicompost (15%) + sand (10%) was found to be best consortia for number of leaves, leaf length, leaf width, leaf area, chlorophyll content at 150 days after planting. Medium containing coco peat (75%) + rice husk (10%) + vermicompost (15%) was found to be best with respect to root length, root spread and number of primary roots respectively.

Introduction

Dracaena reflexa ‘Variegata’ is widely grown ornamental potted plant under subtropical and tropical climates throughout the world. ‘Variegata’ is due to its variegated forms which make it unusual and excellent specimen plant that can be used as indoor foliage plant for interiorscape in homes, offices, hotels, airport lounges and shopping malls.

In the commercial indoor plant production, a variety of growing media are used worldwide and are known to influence the value of

potted ornamental plants significantly (Vendrame *et al.*, 2005). Though garden soil is the most readily available growing medium, owing to its bulkiness and competency from the field of construction and agriculture the availability is greatly reduced for the production of potted plants. In order to reduce the cost of production and make them more adaptable for various conditions research on alternative substrates is of great interest and several alternatives have been proposed which are mainly available as agricultural and forest by products *viz.*, paddy husk, coco peat.

Materials and Methods

This study was carried out under shade net house (75 % shade) at the Botanic Garden, Department of Floriculture and Landscaping, Tamil Nadu Agricultural University, Coimbatore. The experiment was laid out in completely randomized design, with eight set of treatments and replicated three times. Uniformly sized plants were collected and planted at the centre of the pots of 25 cm diameter earthen pots with one plant per pot. Observations on vegetative parameters like plant height, plant spread, number of leaves, leaf length, leaf width and chlorophyll content was recorded at monthly intervals (Table 1). Root parameters like root length, root spread and number of primary roots were recorded at 150 DAP.

Microbial consortia - Azophos + *Pseudomonas fluorescens* + *Methylobacterium* spp. (PPFM) - 2% was applied as a common practice to all the treatments except to control.

Results and Discussion

The effect of media growing media on vegetative parameters of *Draceana reflexa* variegata is presented in Table 1. Significant differences were noticed for all the vegetative characters under study.

Influence of growing media on vegetative parameters. Plant height and spread is an important character considering the foliages growing in indoor conditions. Plant height (35.50 cm) and plant spread (N-S 27.00 cm, E-W 30.12 cm) performed superior in the plants grown in media consortia T₄ {Native soil (25%) + Coco peat (50%) + Vermicompost (15%) + Sand (10%)}. Similar effect of increased plant height in media with coco peat, vermicompost and sand was recorded in *Aglaonema* by Swetha *et al.*,

(2014) where it was reported that highest nutrient uptake may be the reason for the highest plant height.

Leaves serve as an index for measurement of vegetative growth and in determining the yield potential (Ganesh *et al.*, 2014). The growing media T₄ with combination of soil (25%) + coco peat (50%) + vermicompost (15%) + Sand (10%) proved to be highly significant for foliage characters viz., number of leaves (32.50), leaf area (22.92 cm²), leaf length (14.14cm) and leaf width (2.87cm) in *Dracaena reflexa* ‘Variegata’. Regarding to other foliage characters like least leaf production interval (9 days), leaf fresh weight (2.46 g) and leaf dry weight (0.72 g) was recorded maximum in media combination of T₄ {Native soil (25%) + Coco peat (50%) + Vermicompost (15%) + Sand (10%)}.

More number of leaves was due to aeration made available by sand and nutrient status provided by both coco peat and vermicompost. More number of leaves reflect good vigor and their suitability to environment and growth media. Increased number of leaves on media amended with vermicompost in lily Asiatic hybrid ‘Navona’ has reported by Moghadam *et al.*, 2012).

Leaf length and width is a vital parameter that has a direct influence on the quality of the cut foliage. In case of length and width of the leaves, the plants in treatment soil (25%) + coco peat (50%) + vermicompost (15%) + sand (10%) found with the highest leaf length (14.14 cm) and width (2.87 cm). This might be associated with essential nutrients present in coco peat and vermicompost (Vettical *et al.*, 2016). The reason is due to the high organic matter content which increases the water and nutrient holding capacity of the medium and also due to the presence of high N content which plays a vital role in the vegetative

growth of the plant. It also contains highest P and K, which improves the utilization capacity of the plant. This was in line with the findings of Baskaran, Abirami, Simhachalam, and Norman, (2016) in chrysanthemum (*Dendranthema grandiflora* Tzvelev.).

The growing media T₄ with combination of soil (25%) + coco peat (50%) + vermicompost (15%) + Sand (10%) proved highly significant for leaf area (22.92 cm²). Leaf area is considered to be an important character determining the capacity of plant to trap solar energy for photosynthesis which has marked effect on growth of plant. Increased leaf area will cause the net assimilation rate increases so that the rate of growth also gets increased. Maximum number of leaves with larger leaf area was also found in lily cultivars grown on medium amended with coco peat (Nikrazm *et al.*, 2011). Leaf chlorophyll content greatly depends upon leaf size and area. Plants having more leaf area had the highest number of chlorophyll contents (0.60 mg g⁻¹) which might have helped to enhance photosynthetic activities. The increase in chlorophyll contents is mainly due to the assimilation of nitrogen from the growing substances (Hussain *et al.*, 2017). Similar findings reported by (Saleem *et al.*, 2015).

Influence of growing media on root parameters

A good growing substrate affects the development of extensive root system positively, providing sufficient anchorage to plant and allows gaseous exchange between plant roots and atmosphere (Abad, Noguera, Puchades, Maquieira, and Noguera, 2002). In the present study, root parameters *viz.*, root length (29.07cm), root spread (22.16 cm in NS and 21.66 cm in EW) and number of primary roots (6.33 nos.) has significantly increased in plants in the media T₅ with coco peat (75%) + rice husk (10%) +

vermicompost (15%). Coco peat helps in maintaining the appropriate texture of the growing media and prevents compaction, thereby resulting in better root growth and shoot growth. This might be also due to the higher water holding capacity, aeration and available organic matter content of the coco peat medium (Nair and Bharathi, 2015).

Vermicompost is a rich source of mineral nutrition and its addition to media increases quality by increasing microbial activity and microbial biomass which are the key components in nutrient cycling and production of plant growth regulators. This might have resulted in increased length of longest root. Similar result was reported by Shirol, Kulkarni, Reddy, Kanamadi, and Thammaih, (2001) in dwarf poinsettia (*Euphorbia pulcherrima*) recorded maximum root development with vermicompost and sand.

Physiological parameters *viz.*, photosynthetic rate (3.44 μmol m⁻²s⁻¹), transpiration rate (1.28 mmol m⁻²s⁻¹), leaf temperature (36.33 °C), total chlorophyll content (0.605 mg g⁻¹), soluble protein (87.69 mg g⁻¹) and epicuticular wax (8.50 μg cm⁻²) was highest in media combination of T₄ {Native soil (25%) + Coco peat (50%) + Vermicompost (15%) + Sand (10%)}. The highest level of available nitrogen (162 kg ha⁻¹), available phosphorus (30.00 kg ha⁻¹) and available potassium (152 kg ha⁻¹) at the end of the study was observed in media T₄ {Native soil (25%) + Coco peat (50%) + Vermicompost (15%) + Sand (10%)}.

Quality parameters *viz.*, days taken for leaf senescence (38.75 days) and vase life (14.50 days) was observed maximum in the media containing T₄ {Native soil (25%) + Coco peat (50%) + Vermicompost (15%) + Sand (10%)}.

Table.1 Effect of growing media on vegetative parameters of *Dracaena reflexa* ‘Variegata’ at 150 DAP

Treatments	Plant height (cm)	Plant spread (cm)		Number of leaves (Nos.)	Leaf length (cm)	Leaf width (cm)
		N-S	E-W			
T ₁	25.10	23.44	22.90	28.00	12.20	2.28
T ₂	29.60	24.44	23.58	27.60	11.88	2.10
T ₃	31.00	25.50	24.55	29.00	12.78	2.41
T ₄	35.50	30.12	27.00	32.50	14.14	2.87
T ₅	34.60	29.00	27.55	30.70	13.60	2.55
T ₆	31.20	26.40	25.10	27.80	12.50	2.33
T ₇	32.00	27.60	26.55	25.40	12.00	2.18
T ₈	30.22	25.10	24.26	23.80	12.05	2.20
Mean	30.53	26.45	25.19	28.10	12.64	2.37
SE(d)	0.69	0.55	0.52	0.60	0.20	0.05
CD (0.05%)	1.45	1.17	1.09	1.28	0.43	0.11

Table.2 Effect of growing media on vegetative parameters of *Dracaena reflexa* ‘Variegata’ at 150 DAP

Treatments	Root length (cm)	Root spread (cm)		Primary roots (nos.)	Root volume (cm ³)	Stem girth(cm)	Leaf production interval (days)	Fresh weight (g)	Dry weight (g)
		N-S	E-W						
T ₁	9.00	10.03	9.45	3.00	13.70	2.46	14.00	1.90	0.27
T ₂	25.00	18.32	16.88	6.00	15.00	2.29	15.00	2.03	0.43
T ₃	20.00	16.77	15.11	4.00	30.00	2.65	12.00	2.22	0.46
T ₄	19.45	14.67	12.76	6.33	38.55	2.96	9.00	2.46	0.72
T ₅	29.07	22.16	21.66	9.88	40.00	2.87	11.00	2.21	0.46
T ₆	26.66	19.11	18.43	5.00	22.00	2.60	18.00	2.17	0.50
T ₇	16.00	12.00	10.56	3.77	14.65	2.55	19.00	1.99	0.31
T ₈	17.33	11.55	10.11	5.66	20.00	2.43	20.00	1.95	0.32
Mean	20.31	15.58	14.37	5.46	24.24	2.60	14.75	2.11	0.43
SE(d)	0.54	0.14	0.34	0.14	0.67	0.05	0.30	0.05	0.008
CD (0.05%)	1.15	0.30	0.72	0.30	1.41	0.11	0.63	0.11	0.017

Table.3 Effect of growing media on physiological parameters of *Dracaena reflexa* ‘Variegata’ at 150 DAP

Treatments	Leaf area (cm ²)	Photosynthetic rate (μmol m ⁻² s ⁻¹)	Transpiration rate (mmol m ⁻² s ⁻¹)	Leaf temperature(°C)
T ₁	14.55	2.02	1.24	36.00
T ₂	15.06	0.93	1.19	36.00
T ₃	20.48	1.65	1.23	36.23
T ₄	22.92	3.44	1.28	36.33
T ₅	20.54	1.71	1.11	36.23
T ₆	17.95	2.76	1.13	36.07
T ₇	16.77	1.52	1.15	36.07
T ₈	15.77	2.45	0.75	36.20
Mean	18.01	2.06	1.13	36.14
SE (d).	0.52	0.03	0.03	0.61
CD (0.05%)	1.09	0.07	0.05	NS

* NS - Not significant

Table.4 Effect of growing media on biochemical parameters of *Dracaena reflexa* ‘Variegata’ at 150 DAP

Treatments	Chlorophyll “a” (mg g ⁻¹)	Chlorophyll “b” (mg g ⁻¹)	Total chlorophyll (mg g ⁻¹)	Soluble Protein (mg g ⁻¹)	Epicuticular wax (μg cm ⁻²)
T ₁	0.18	0.06	0.25	32.82	5.92
T ₂	0.16	0.04	0.20	35.19	5.72
T ₃	0.36	0.07	0.43	87.69	6.31
T ₄	0.47	0.13	0.60	85.71	8.50
T ₅	0.42	0.09	0.51	57.37	2.23
T ₆	0.43	0.10	0.52	64.42	7.82
T ₇	0.28	0.07	0.35	71.92	2.49
T ₈	0.25	0.06	0.31	81.09	5.48
Mean	0.32	0.08	0.39	64.53	5.56
SE(d)	0.006	0.003	0.010	1.38	0.08
CD (0.05%)	0.012	0.007	0.022	2.92	0.17

Table.5 Effect of growing media on quality parameters of *Dracaena reflexa* ‘Variegata’ at 150 DAP

Treatments	Days taken for leaf senescence (days)	Vase life (days)
T₁	22.25	9.00
T₂	25.00	10.50
T₃	34.00	13.00
T₄	38.75	14.50
T₅	36.50	9.00
T₆	30.25	11.50
T₇	31.00	12.00
T₈	28.00	10.00
Mean	30.72	11.19
SE(d)	0.43	0.29
CD (0.05%)	0.91	0.60

The cost of cultivation and the income generated revealed that maximum benefit cost ratio (1.81) in *Asparagus sprengeri* and *Dracaena reflexa* ‘Variegata’ was observed in T₄ {Native soil (25%) + Coco peat (50%) + Vermicompost (15%) + Sand (10%)}. .

From the above investigation, it can be concluded that media comprising of soil (25%) + coco peat (50%) + vermicompost (15%) + sand (10 %) were suitable for foliage potted plants. As pot weight is an important factor during forcing program and shipping, the lighter the pot weight, the easier the handling. Further research may be promoted with using other alternate media for increasing the production of foliage plants.

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