Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(5): 3006-3009
Received: 01-07-2018
Accepted: 03-08-2018

K Sandeep
Floriculture and Landscaping, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences (Formerly Allahabad Agriculture Institute), Allahabad, Uttar Pradesh, India

U Fatmi
Assistant Professor in Floriclture and Landscaping, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences (Formerly Allahabad Agriculture Institute), Allahabad, Uttar Pradesh, India

Daiahun Talang
Floriculture and Landscaping, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences (Formerly Allahabad Agriculture Institute), Allahabad, Uttar Pradesh, India

K priyatham
Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology & Sciences (Formerly Allahabad Agriculture Institute), Allahabad, Uttar Pradesh, India

Correspondence
K Sandeep
Floriculture and Landscaping, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences (Formerly Allahabad Agriculture Institute), Allahabad, Uttar Pradesh, India

Effect of potting media on growth and development in different species of *Nephrolepis* fern under shade net conditions (*N. falcata, N. cardifolia duffi, N. multifolia*)

K Sandeep, U Fatmi, Daiahun Talang and K Priyatham

Abstract
A Pot experiment with *Nephrolepis* was conducted under 25% green shade net conditions in the Department of Horticulture, SHUATS, Allahabad, during 2017 – 2018. The experiment laid out in factorial completely randomized design, replicated thrice with fifteen treatments combinations (Factor A comprising of *N. falcata, N. cordifolia duffi, N. multifolia* and factor B comprising of soil, cocopeat, farmyard manure, vermicompost and sand). Among all the treatment combinations of *Nephrolepis sp.* and potting media, *N. falcata* grown in medium consisting of cocopeat + sand + vermicompost 1:1:1 v/v) was found to be stastically significant in terms of shade net conditions.

Keywords: Cocopeat, vermicompost, sand, soil, *N. falcata*, N. cordifolia duffi, *N. multifolia*

1. Introduction
Nephrolepis Fern has graceful green, drooping fronds that are naturally cut in such a way to give a ruffled looking effect and therefore it looks really good in a hanging basket or in a place where the fronds can hang down over something, for example on the edge of a bookcase or shelf.
N. cordifolia duffi, N. falcata, N. multiflora, is readily available, relatively cheap and is a great starter fern if you enjoy the lush green foliage and the feelings of peaceful tranquility they seem to evoke in people. It's also one of the top rated plants for removing air pollutants from the air and because of its almost insatiable appetite for water it pumps out large amounts of water vapor into the nearby air, thereby increasing humidity (Hibberd *et al.*)
One of the soilless materials widely available in the tropics is the coconut coir dust or commercially known as cocopeat. A byproduct of processing coconut husks is known as coir dust, coco peat, coir pith or simply coir. Coir is a versatile natural fiber extracted from mesocarp tissue, or husk of the coconut. The husk contains 20% to 30% fiber of varying length and holds 8-9 times its weight in water. Can be reused for up to 4 years. The properties of Coco Peat make it resistant to bacterial and fungal growth, easy to handle and great oxygenation properties which is important for healthy root development. Environment friendly. Coir is low in nitrogen, calcium, and magnesium but relatively high in phosphorus and potassium. But Cocopeat has natural salts so it is not suitable for recycling hydroponic systems. As a growing medium, cocopeat can be used to produce a number of crop species with acceptable quality in the tropics (Singh *et al.*).
Vermicompost is developed using earthworm. The earthworms consume organic matter and excrete it as cast. This cast is used as Vermicompost. It is rich in plant nutrients and beneficial bacteria and vesicular arbuscular mycorrhiza (VAM) fungi. VAM fungi solubilizes soil phosphorus and makes it readily available to crop plants. Vermicompost being rich in bacteria, increases nitrogen fixation in the soil. Depend upon type of base material used for composting, Vermicompost, on an average, contains 3% nitrogen, 1% Phosphorus and 1.5% potash (Singh *et al.*).
Farm yard manure (FYM) is composed of dung and urine of farm animals along litter and left over materials from roughages or o greens fed to the farm animals. It contains, on an average, 0.5% N, 0.2% P and 0.5% K. usually, cow dung and urine of animals along with their litter and waste fed or collected and placed in trench daily and when filled in, it is covered with field. It decomposes in two-three months when it is considered useable (Singh *et al.*).

Materials and methods
A pot experiment is carried at Horticultural Experimental Field in the Department of Horticulture,

Sam Higginbottom University of Agriculture Technology And Sciences (SHUATS), Allahabad during winter season of 2017-18.

Allahabad is situated at an elevation of 78 meters above sea level at 25.87 degree north altitude and 81.15 degree E longitude. This region has a subtropical climate prevailing in the south-east part of U.P.

Name of the Crop	:	Fern
Family	:	Nephrolepidaceae
Design of experiment	:	Factorial Completely Randomized Design (FCRD)
No. of replications	:	3
No. of factors	:	2 (3×5)
No. of plants per treatment	:	5

Treatment combinations

No. of Treatments	Treatment Combinations
T_1	S_1M_1 (*Nephrolepis falcata*+ Soil)
T_2	S_1M_2 (*N. falcata* + Cocopeat + FYM)
T_3	S_1M_3 (*N. falcata* + Cocopeat + Vermicompost)
T_4	S_1M_4 (*N. falcata* + Cocopeat +Sand + FYM)
T_5	S_1M_5 (*N. falcata* + Cocopeat+ Sand + Vermicompost)
T_6	S_2M_1 (*N. cardifolia* duffi + Soil)
T_7	S_2M_2 (*N. cardifolia duffi* + Cocopeat + FYM)
T_8	S_2M_3 (*N. cardifolia duffi* + Cocopeat + Vermicompost)
T_9	S_2M_4 (*N. cardifolia duffi* + Cocopeat + Sand + FYM)
T_{10}	S_2M_5 (*N. cardifolia duffi* + Cocopeat +Sand + Vermicompost)
T_{11}	S_3M_1 (*N. multiflora* + Soil)
T_{12}	S_3M_2 (N. *multiflora* + Cocopeat + FYM)
T_{13}	S_3M_3 (N. *multiflora* + Cocopeat + Vermicompost)
T_{14}	S_3M_4 (N. *multiflora* + Cocopeat + Sand + FYM)
T_{15}	S3M5 (N. *multiflora* + Cocopeat + Sand + Vermicompost)

The observations were made on different characters, *viz*., survival percentage (%), plant height (cm) 30, 60, 90,120 DAP, number of fronds30, 60, 90,120 DAP, plant spread (cm) 30, 60, 90,120 DAP, mean frond length (cm), length of longest frond (cm), rachis length (cm), frond area (cm^2), growth rate (%),vase life (days), rhizome spread (cm) and rhizome length (cm)

Result and discussion

The maximum plant height (26 cm) was recorded in T_5 (cocopeat + sand + vermicompost) as a potting media in S_1 followed by (25.67 cm) T_3 (cocopeat + vermicompost) in S_1. The plant height was (12 cm) found to be minimum in T_6 (soil) *Nephrolepis cordifolia duffi* (Table 1). Maximum plant height might be due to vermicompost, which is rich in humus and contains valuable vitamins, enzymes and hormones like Auxins, Gibberellins, etc. for better growth and development. The maximum no of fronds (50.33) was recorded in T_{10} (cocopeat + sand + vermicompost) as a potting media in S_2 (*Nephrolepis cordifolia duffi)* followed by (47.33) T_8 (cocopeat + vermicompost) S_2 (*N. cordifolia duffi*). The minimum no of fronds (15.67) was found to be in T_8 (soil) in *Nephrolepis multiflora* (Table 2). Maximum number of fronds might be due to vermicompost, which is rich in humus and contains valuable vitamins, enzymes and hormones like Auxins, Gibberellins, etc. for better growth and development (Shadanpour *et al.*, 2011) [13]

The maximum plant spread (50 cm) was recorded in T_5 (cocopeat + sand + vermicompost) as a potting media in S_1 (*Nephrolepis falcata)* followed by (48.00 cm) T_3 (cocopeat + vermicompost) in S_1 (*N. falcata*). The minimum plant spread (25.37 cm) was found to be in T_6 (soil) in *Nephrolepis cordifolia duffi* (Table 3). Plant spread differed significantly among all the treatments might be due to the rich source of nutrients present in Vermicompost (Ikram *et al.,* 2016) and varied growth behavior in different species and further modified by environmental conditions prevailing during the time of crop growth.

The maximum vase life (15 days) was recorded in T_5 (cocopeat + sand + vermicompost) as a potting media in *Nephrolepis falcata* (Table 4). The minimum vase life (9 days) in T_6 (soil) in *Nephrolepis cordifolia duffi.* Vase life differed significantly among all the treatments might be due to the rich source of nutrients present in Vermicompost (Ikram *et al.,* 2016) and varied growth behavior in different species and further modified by environmental conditions prevailing during the time of crop growth.

The maximum rhizome spread (21.50 cm) was recorded in T_{15} (cocopeat + sand + vermicompost) as a potting media in *Nephrolepis multilora* followed by (20) T_{13} in S_3 (*N. multilora*) (cocopeat + vermicompost). The minimum rhizome spread (10.67cm) in T_6 (soil) in *Nephrolepis cordifolia duffi* (Table 5). Rhizome spread (cm) differed significantly among all the treatments might be due to the rich source of nutrients present in vermicompost & sand provide more aeration and varied growth behavior in different species and further modified by environmental conditions prevailing during the time of crop growth.

Table 1: Effect of potting media on plant height (cm) at 30, 60, 90, 120 DAP of different *Nephrolepis* species under shade net conditions

Media (M)	30 DAP			Mean (m)	60 DAP			Mean (m)
	Species (S)				Species (S)			
	S1	S2	S3		S1	S2	S3	
M1	11.00	8.33	11.67	10.33	13.67	10.00	15.55	13.07
M2	13.00	9.00	12.67	17.22	16.00	10.88	16.00	14.29
M3	14.33	10.67	13.67	19.89	17.00	11.35	17.45	15.27
M4	13.00	9.33	12.00	18.44	15.00	11.00	16.33	14.11
M5	15.33	11.33	15.33	21.89	19.67	12.67	18.00	16.78
Mean (S)	13.33	9.73	13.07		16.27	11.18	16.67	
	F-test	S. Em. (±)	C.D. at 0.05%		F-test	S. Em. (±)	C.D. at 0.05%	
Species (S)	S	0.422	0.880		S	0.653	1.363	
Potting media(M)	S	0.544	1.137		S	0.843	1.759	

(S x M)	NS	0.943	1.969		NS	1.459	3.047	
Media (M)	**90 DAP**			**Mean (m)**	**120 DAP**			**Mean (m)**
	Species (S)				**Species (S)**			
	S1	**S2**	**S3**		**S1**	**S2**	**S3**	
M1	16.67	11.00	16.45	14.71	18.67	12.00	19.67	16.78
M2	20.00	13.33	18.33	17.22	24.67	15.33	22.00	20.67
M3	21.67	14.00	19.33	18.33	25.67	16.33	24.33	22.11
M4	20.00	13.00	18.00	17.00	24.00	15.00	22.00	20.33
M5	22.67	15.00	21.33	19.67	26.00	17.67	25.00	22.89
Mean (S)	20.20	13.27	18.69		23.80	15.27	22.60	
	F-test	S. Em. (±)	C.D. at 0.05%		F-test	S. Em. (±)	C.D. at 0.05%	
Species (S)	S	0.451	0.942	S	S	0.750	1.567	
Potting media(M)	S	0.583	1.217	S	S	0.969	2.023	
(S x M)	NS	1.009	2.107	NS	NS	1.678	3.503	

Table 2: Effect of potting media on number of fronds at 30, 60, 90 and 120 DAP of different *Nephrolepis* species under shade net

Media (M)	**30 DAP**			**60 DAP**		
	Species (S)			**Species (S)**		
	S1	**S2**	**S3**	**S1**	**S2**	**S3**
M1	8.67	20.00	5.67	12.00	28.33	10.00
M2	10.33	22.33	6.67	14.00	31.67	11.00
M3	11.67	24.67	8.67	15.33	33.00	12.00
M4	10.00	22.33	7.00	14.00	32.67	10.00
M5	13.67	26.33	8.33	17.00	36.33	12.67
Mean (S)	10.87	23.13	7.27	14.47	32.40	11.13
	F-test	S. Em. (±)	C.D. at 0.05%	F-test	S. Em. (±)	C.D. at 0.05%
Species (S)	S	0.494	1.032	S	0.606	1.264
Potting media(M)	S	0.638	1.333	S	0.782	1.632
(S x M)	NS	1.106	2.308	NS	1.354	2.827
Media (M)	**90 DAP**			**120 DAP**		
	Species (S)			**Species (S)**		
	S1	**S2**	**S3**	**S1**	**S2**	**S3**
M1	15.33	34.33	11.67	21.67	39.33	15.67
M2	17.67	40.67	13.33	22.67	42.33	18.33
M3	18.55	41.33	14.67	23.33	47.33	19.00
M4	18.00	39.00	13.00	22.00	45.00	17.00
M5	22.33	44.67	16.00	24.00	50.33	20.00
Mean (S)	18.38	40.00	13.73	22.73	44.86	18.00
	F-test	S. Em. (±)	C.D. at 0.05%	F-test	S. Em. (±)	C.D. at 0.05%
Species (S)	S	0.105	0.220	S	0.149	0.311
Potting media(M)	S	0.136	0.284	S	0.192	0.402
(S x M)	S	0.236	0.492	S	0.333	0.696

Table 3: Effect of potting media on plant spread (cm) at 30, 60, 90 and 120 DAP of different *Nephrolepis* species under shade net conditions

Media (M)	**30 DAP**			**60 DAP**		
	Species (S)			**Species (S)**		
	S1	**S2**	**S3**	**S1**	**S2**	**S3**
M1	22.00	12.33	16.00	28.33	17.00	20.00
M2	22.33	13.00	18.00	34.67	20.33	22.33
M3	24.00	14.00	18.44	35.00	21.45	23.33
M4	23.00	11.00	14.67	33.00	20.00	21.67
M5	26.33	18.67	20.67	36.67	22.33	25.33
Mean (S)	23.53	13.80	17.56	33.53	20.22	22.53
	F-test	S. Em. (±)	C.D. at 0.05%	F-test	S. Em. (±)	C.D. at 0.05%
Species (S)	S	0.805	1.681	S	0.430	0.899
Potting media(M)	S	1.039	2.170	S	0.556	1.160
(S x M)	NS	1.800	3.759	S	0.962	2.009
Media (M)	**90 DAP**			**120 DAP**		
	Species (S)			**Species (S)**		
	S1	**S2**	**S3**	**S1**	**S2**	**S3**
M1	35.67	20.33	22.00	40.00	25.37	28.33
M2	40.00	24.33	27.67	47.00	28.00	33.17
M3	41.33	25.67	28.67	48.33	32.57	34.33
M4	40.00	24.00	26.33	47.00	29.67	33.00
M5	45.17	30.33	31.00	50.67	33.00	36.33
Mean (S)	40.43	24.93	27.13	46.60	29.72	33.03
	F-test	S. Em. (±)	C.D. at 0.05%	F-test	S. Em. (±)	C.D. at 0.05%
Species (S)	S	0.784	1.636	S	0.136	0.284
Potting media(M)	S	1.012	2.112	S	0.176	0.367
(S x M)	NS	1.752	3.658	S	0.304	0.635

Table 4: Effect of potting media on Vase Life (Days) at 120 DAP of different *Nephrolepis* species under shade net conditions

Media (M)	Species (S)			Mean (m)
	S1	S2	S3	
M1	13.00	9.00	10.00	10.67
M2	14.00	10.00	11.00	11.67
M3	14.00	10.00	11.00	11.67
M4	14.00	10.00	12.00	12.00
M5	15.00	10.00	12.00	12.33
Mean (S)	14.00	9.80	11.20	
	F-test	S. Em. (±)	C.D. at 0.05%	
Species (S)	S	0.251	0.524	
Potting media(M)	S	0.324	0.676	
(S x M)	NS	0.561	1.172	

Table 5: Effect of potting media on rhizome spread (cm) at 120 DAP of different *Nephrolepis* species under shade net conditions

Media (M)	Species (S)			Mean (m)
	S1	S2	S3	
M1	13.50	16.10	14.00	14.53
M2	16.00	19.00	17.00	17.33
M3	20.00	19.50	18.00	19.17
M4	18.50	17.50	17.50	17.83
M5	21.50	20.00	20.00	20.50
Mean (S)	17.90	18.42	17.30	
	F-test	S. Em. (±)	C.D. at 0.05%	
Species (S)	S	0.236	0.692	
Potting media(M)	S	0.304	0.895	
(S x M)	S	0.527	1.555	

References

1. Anjana Fatmi U, Singh D. Effect of different potting media in different potted croton (*Codieum variegatum*) varieties under shade net condition in Allahabad, India. Int. J Curr. Microbiol. App. Sci. 2017; 6(8):3760-3764.
2. Atif MJ, Jellani G, Malik MHA, Saleem N, Ullah H, Khanand MZ, *et al.* Different growth media effect the germination and growth of tomato seedlings. Sci, Tech and Develop. 2016; 35(3):123-127.
3. Fuad M, Mohamed MTM, Salleh NS, Anwar MP, Awang Y, Fauzi RM. Effect of different concentrations of benzyladenine and frequency of watering on growth and quality of Dracaena sanderiana and Codiaeum variegatum. J Envi Bio. 2014; 35:1047-1052.
4. Gohil P, Gohil M, Rajatiya J, Halepotara F, Solanki M, Malam VR, *et al.* Role of growing media for ornamental pot plants. Int. J Pure App. Biosci. 2018; 6(1):1219-1224.
5. Khayyat M, Nazari F, Salehi HH. Effects of different pot mixtures on pothos (*Epipremnum aureum* Lind L.) and Andre 'Golden Pothos') Growth and Development. J Agric. & Envi. Sci. 2007; 2(4):341-348.
6. Khelikuzzaman MH. Effect of different potting media on growth of a hanging ornamental plant (*Tradescantia sp*.). J Trop. Agric. & Fd. Sci. 2007; 35(1):41-48.
7. Muraleedharan A, Karuppaiah P. Studies on the effect of shade and growing media on the growth and yield of Anthurium (*Anthurium andreanum*) cv. Int. J Adv Res in Eng. Sci & Tech. 2015; 2(2):28-31.
8. Nair SA, Sangama Raghupathi, HB Panneerselvam P. Influence of substrates and nutrient levels on production and quality of cut foliage in leather leaf ferns (*Rumohra adiantiformis*). sco. Plant res. 2015; 28(3):20-26.
9. Nirupam S, Jana D, Nellipalli VK, Mandal T. Efficay of different media composition on Dieffenbachia and Dracaena in Pots. Int. Qua. J Life Sci. 2016; 11(4):2457-2461.
10. Nuchhungi k, James LT, Thanga, Lalnunmawia F, Plant performance of *Anthurium andreanum* as affected by shade conditions and different conventional nutrient sources. J Horti and For. 2012; 4(2):22-26.
11. Sharma Y, Vasndhara M. Standardization of media and nutrient concentration for coleus (*Plectranthus barbatus Andr*.) under substrate culture. J Plant Nutri. 2018; 445-452.
12. Swetha S, Padmalatha T, Dhanumjaya KR, Shankar AS. Effect of potting media on growth and quality in Aglaonema. J Hortl, Sci. 2014; 9(1):90-93.
13. Shadanpour F, Mohammadi A, Torkashvand, Hashemi Majd k. The possibility using vermicompost as the growth medium J Orn & Hortl Plants. 2011; 1(3):153-160
14. Younis A, Atif Riaz Siddique, MI, Byung KL, Hwang YJ, Asif MK. Anatomical and morphological variation in *Dracaena reflexa* '*Variegata*' grown in different organic potting. Subst, Flower Res, J. 2013; 21(4):162-171.