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Performance of indoor plants in pots after transplanting

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Abstract
The present investigation entitled **"**Performance of indoor plants in pots after transplanting" was conducted during the year 2020-21 at Hi-tech nursery, College of Horticulture, Dapoli, Dist. Ratnagiri (M.S.). The treatments consisted of eight indoor foliage plants viz. *Areca palm, Snake plant, Red edged dracaena, Dracaena yellow, Ficus benjamina, Philodendron, Dieffenbachia* and *Aralia*. With eight treatments, three replications the experiment was laid out in Randomized Block Design and 't' test for shade effect. The study was conducted in pots to determine the effect of shade level on growth and development of these different indoor plants. In this study, we simulated low light intensity (50% sunlight) and evaluated the morphological and foliage colour related parameters of these eight indoor foliage species. Also, the study indicated that the shade nets provide the optimum growing environment for successful cultivation of foliage indoor plants. With respect to T_1 was recorded significantly maximum plant height (100.66 cm) in shade condition. Furthermore, the highest leaf length (54.05 cm) and leaf breadth (13.55 cm) was found in T_2 and T_7 respectively. The average internodal length was observed (3.95 cm) in T_6 and maximum leaf area was observed (173.08 cm²) in T_7. In shade condition all the plant species fallen under the green group. Shade improve foliar colour and chlorophyll attentiveness by reducing light. Thus, considering the shade condition the average survival percentage was observed 100% in both T_2 and T_6, and also observed overall performance of various indoor plants superior under shade condition.

Keywords: indoor plants, shade nets, pots, transplanted, vegetative, foliage, ornamentals

Introduction
Foliage plants, defined literally, would include all plants grown for their attractive leaves rather than for flowers or fruits. In general, horticultural terms, however, foliage plants are mostly those with attractive foliage and flowers that are able to survive and grow indoors. They are being used by the humans, even in the prehistoric times and the demand of ornamental plants for personal and ceremonial use has been increased. Foliage plants, in common terminology, are called house plants. They are used as living plants for interior decoration or interior plant scaping. They are most often intentionally planted for aesthetic appeal. However, ornamental plants also serve some less obvious uses such as for fragrance, for attracting wildlife and for cleaning the air. Ornamentals bring aesthetic feelings to our surroundings (Riaz *et al.*, 2002) [7] and also economically important in horticultural trade, all over the world. Ornamental encompass a wide array of plants and are classified into several groups; cut flowers, ornamental grasses, lawn or turf grasses, potted and indoor plants, bedding plants, trees and shrubs. Most foliage plants originated in the tropical and subtropical regions where they grow under tree canopies on shaded forest floors or live-in trees as epiphytes (Henny and Chen, 2003) [3].
Shade nets are of vital importance for growth and development of different indoor foliage plants due to its low light requirement. Standardizing shade levels in net house cultivation helps in obtaining better quality plants. Response of the crop to different shade levels will be studied to discourse the concern in deciding suitable growing conditions for the plants.

Material and Methods
The field trail entitled "Performance of indoor plants in pots after transplanting" was carried out in eight indoor foliage plants viz. *Areca palm, Snake plant, Red edged dracaena, Dracaena yellow, Ficus benjamina, Philodendron, Dieffenbachia* and *Aralia* at Hi-tech nursery, College of Horticulture, Dapoli, Dist. Ratnagiri (M.S.) during the year 2020-21. The experiment was laid out in Randomized Block Design with eight treatments replicated thrice

and 't' test for shade effect. The eight treatments applied were 15 DAT, 30 DAT, 45 DAT, 60 DAT, 75 DAT, 90 DAT, 105 DAT, 120 DAT, 135 DAT and 150 DAT respectively by using 50% shade level along with open field condition. Experiment was conducted as per the approval outline of research work from October, 2020 to April, 2021. Statistical analysis of the data was collected during the course studies was carried out by standard method of variance described by Panse and Sukhatme (1978) [5].

Result and Discussion

Vegetative parameters

Plant height

Among the different research periods, plant height in both open and shade condition varied and 't' test showed significant variation between both the growing conditions. The maximum plant height was observed in shade condition which was 100.66 cm in Areca palm (T_1). The plants grown under low light level were found to be more apical dominant than those grown under high or full light intensities. Boston fern plant showed linear increase in plant height with increase in shade level Singh *et al.* (2014) [9].

Length of leaves

The average highest leaf length was observed in 50 percent shade condition which was 54.05 cm in Snake plant (T_2) and 't' test showed significant variation between both the growing conditions. Plants under shade condition showed larger leaf length because under low light level cells expand further to receive light for photosynthesis. The maximum leaf length was observed in Dracaena under 80 percent shade level, reported by Vladimirova *et al.* (1997) [10].

Breadth of leaves

The maximum leaf breadth was observed in 50 percent shade condition which was 13.55 cm in Dieffenbachia (T_7) and 't' test showed significant variation between both growing conditions. The boundary layers help to improve leaf growth and photosynthetic activity which elongates leaf breadth. The result was in agreement with Das (2010) [1] who reported that leaf breadth was influenced by low light irradiance.

Internodal length

The average internodal length was observed in shade condition which was 3.95 cm in Philodendron (T_6) and 't' test showed that was a significant variation between both the growing conditions. The length of internode (the part of the stem between each leaf) is longer for shade shoots than sun shoots. The results are conformity with findings Rasheed *et al.* (2014) [6] showed that longest internodal length (0.51 cm) was observed in Dracaena plant.

Leaf area

Among the different research periods, the maximum leaf area was found in shade condition which was 173.08 cm² in Dieffenbachia (T_7). Plants under shade showed larger leaf area because under low light level cells expand further to receive more light for photosynthesis. The result was in agreement with those increase in leaf area of begonia with increase in shade level by Jeong *et al.* (2007) [4].

Foliage colour

Shade improves foliar colour and chlorophyll attentiveness by reducing light. In shade condition all treatments fallen under green group. The shade leaves contain a greater mass of chlorophyll and are darker green in colour. Bright light would destroy the chlorophyll. The experiment on growth of Sage (*Salvia officinalis)* with different shade level of 0%, 30%, 50% and 70% shade levels, the result showed that leaf colour under 50% and 70% shade levels was yellowish-green by Sedigheh Rezai *et al.* (2018) [8].

Survival percentage

Among the different research periods, the average survival percentage was observed maximum in shade condition which was 100.00% in both Snake plant (T_2) and Philodendron (T_6) respectively followed by 96.66% in *Ficus benjamina* (T_5) and 't' test showed significant variation in both conditions. Similar results are in findings of Dev *et al.* (2018) [2] who observed that plant survival of cactus pear was significantly influenced by shading and up to 50 percent shade was positive for increasing plant survival. Plants grown under 25 percent and 50 percent shade levels showed good survival (91.66%) respectively.

Table 1: Effect of open and shade conditions on vegetative parameters of indoor plants after transplanting in pots

Treatments		Plant height (cm)		Length of leaves (cm)		Breadth of leaves (cm)		Internodal length (cm)		Leaf area (cm²)	
		150 DAT		150 DAT		150 DAT		150 DAT		150 DAT	
		Open	Shade	Open	Shade	Open	Shade	open	Shade	Open	Shade
T_1	Areca palm	87.66	100.66	28.80	31.80	1.80	3.67	0.00	0.00	19.53	22.53
T_2	Snake plant	51.67	57.20	51.38	54.05	6.19	8.19	0.00	0.00	116.50	120.50
T_3	Red edge dracaena	57.46	70.46	12.99	14.99	3.71	4.45	1.47	1.52	27.38	30.38
T_4	Dracaena yellow	59.00	72.00	19.51	21.51	3.49	4.49	2.78	2.91	45.06	48.06
T_5	Ficus benjamina	55.46	68.46	9.87	11.87	3.76	4.76	1.95	2.13	15.66	18.66
T_6	Philodendron	58.97	70.52	19.19	22.19	7.58	9.58	3.90	3.95	98.42	102.42
T_7	Diffenbachia	46.80	59.80	35.40	38.40	11.74	13.55	1.16	1.22	169.08	173.08
T_8	Aralia	53.53	66.53	3.73	5.73	3.43	4.43	3.19	3.38	16.23	19.23
Range		56.92-97.44	46.80-87.66	3.73-51.38	5.73-54.05	1.80-11.55	3.67-13.55	0.00-3.90	0.00-3.95	15.66-169.08	18.66-173.08
Result		SIG	SIG	SIG	SIG	SIG	SIG	SIG	SIG	SIG	SIG
Mean		58.82	70.70	22.61	25.07	5.21	6.64	1.79	1.87	63.22	66.86
S. Em. ±		2.78	2.76	0.77	0.79	0.32	0.29	0.04	0.05	0.45	4.31
C. D. at 5%		8.43	8.38	2.33	2.41	0.98	0.88	0.13	0.16	1.37	13.8
't' test		12.84*		13.84*		7.45*		3.10*		18.44*	

DAT- Days after transplanting *'t' test significant

Table 2: Foliage colour was assessed by using- Royal Horticultural Society (RHS) colour chart

Treatment	Colour	Range	Colour	Range
	15 DAT	15 DAT	150 DAT	150 DAT
T_1	Deep yellowish green	141 B	Light olive	152 B
T_2	Moderate olive green	146 A	Moderate olive green	146 C
T_3	Greyish olive green	NN137 A	Greyish olive green	NN137 C
T_4	Strong yellowish green	N144 A	Strong yellow green	143 B
T_5	Strong yellow green	144 B	Moderate olive green	147 A
T_6	Dark yellowish green	139 A	Moderate olive green	146 A
T_7	Strong yellow green	143 B	Greyish olive green	NN137 B
T_8	Moderate olive green	147 A	Strong yellow green	145 A

DAT- Days after transplanting

Table 3: Survival percentage (%) of all indoor plants in pots after transplanting under open and shade conditions

Treatments		Survival percentage (%)	
		150 DAT	150 DAT
		OPEN	SHADE
T_1	Areca palm	93.64	97.54
T_2	Snake plant	95.66	100.00
T_3	Red edge dracaena	90.00	91.33
T_4	Dracaena yellow	91.00	93.00
T_5	Ficus benjamina	94.65	96.66
T_6	Philodendron	94.66	100.00
T_7	Diffenbachia	92.67	95.60
T_8	Aralia	90.00	91.00
Range		90.00-95.66	91.33-100.00
Result		SIG	SIG
Mean		92.79	95.66
S. Em. ±		1.93	2.39
C. D. at 5%		5.87	7.25
't' test		5.23*	

Conclusion

From the present studies, it can be concluded that from the experiment the plants which were grown under partially shade condition performed better for growth parameters like plant height, leaf length, leaf breadth, Internodal length, leaf area and survival percentage when compared to open field condition. Shade net conditions also improved the foliage colours of indoor plants effectively.

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