



Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2024.v24.no.2.274>

VEGETATIVE GROWTH AND VISUAL QUALITY IN PHILODENDRON AS INFLUENCED BY POME SLUDGE BASED AT DIFFERENT LIGHT REGIMES

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(Date of Receiving-01-07-2024; Date of Acceptance-07-09-2024)

ABSTRACT

The influence of different growing media and light regimes on growth and visual quality of philodendron was studied at Dr. Y.S.R.H.U.-C.O.H., Venkataramannagudem, during the year 2024. The experiment was conducted in factorial design with two factors each at four levels. First factor was growing media and second light regime. Among the vegetative parameters plant height, plant spread, number of leaves and in visual quality - plant grade, colour grade exhibited significant differences at all growth stages due to media composition, light regimes and their interactions. In growing media, red soil: palm oil mill effluent sludge (POMES) (1:2) recorded maximum in plant height followed by red soil: palm oil mill effluent sludge (POMES) (1:1). Lowest was observed in red soil alone. Among different light regimes, the height of philodendrons was highest in the plants grown inside the room followed by those grown on staircase. The lowest was recorded under coconut tree shade. With respect to the effect of interactions, the highest plant height was observed in the combination of inside the room + red soil: palm oil mill effluent sludge (1:2) followed by staircase + red soil: palm oil mill effluent sludge (1:2). The lowest was observed in plants grown under coconut tree shade + red soil. The same trend was followed in other parameters.

Key words : Philodendron, Growing media, Light regime, POME sludge, Visual quality.

Introduction

The philodendron is the second largest genus contains approximately 700 species, belongs to family Araceae (Croat and Thomas, 1997). It is native to tropical America and west indies with different growth styles, durable and attractive leaves. These species are herbaceous climbing vines, woody-stemmed plants that may reach 15 feet in height (McConnell *et al.*, 2007). They are not only used for decorative purpose but also absorbs harmful gases and cleans the air inside modern.

The palm oil processing business produces several mill residues under local horticulture conditions, one of which being palm oil mill effluent (POME) sludge. For example, oil palm waste makes an excellent raw material for composting in order to recycle nutrients and reduce

volume.

The placement of indoor potted plants at different light regimes as the environment varies from staircase, at main entrance to corridors, large halls, small rooms etc. Thus, nutritional support from growing media can be altered by the micro climate and light availability under indoor conditions. Therefore, the objective includes to study the effect of growing media compositions on growth and quality of philodendron.

Materials and Methods

This experiment was carried out at Department of Floriculture and Landscaping, Y.S.R.H.U., College of Horticulture, Venkataramannagudem during January to April 2024. This was laid out in a factorial completely randomized block design (FCRD) with two factors each

consists of four levels *viz.*, growing media (red soil: POMES (1:1), red soil: POMES (1:2), red soil: POMES (2:1), and red soil alone) and different light regimes (corridor, staircase, inside the room, under coconut tree shade) respectively with two replications, each has twenty plants. One month old plants are transplanted into 13-inch polybags filled with media as per the treatment. Observations were recorded on plant height (cm), plant spread (cm²), number of plants, visual plant grade and colour grade was recorded at 30, 60, 90 days after planting.

Results and Discussion

Plant height (cm)

The plant height varied significantly at all intervals (30, 60 and 90 DAP) under the influence of growing media, light regimes and their interactions (Table 1). It was revealed that the mean plant height increased from 20.93 cm (30 DAP) to 28.81 cm (90 DAP).

Among various growing media, red soil: palm oil mill effluent sludge (POME sludge) (1:2) recorded maximum plant height (31.79 cm), followed by red soil: POME sludge (1:1) (29.35) at 90 days after planting (DAP). Red soil medium exhibited the lowest plant height (26.23 cm). The main effect of light regime showed that the tallest plants at 90 DAP were found inside the room (31.10 cm), followed by those placed on staircase (30.18 cm). Whereas, the shortest plants (25.55 cm) were observed under coconut tree shade. The combination of red soil: POME sludge (1:2) + inside the room (35.55 cm) exhibited the highest plant height followed by red soil: POME sludge (1:2) + staircase (33.45 cm). The lowest plant height (23.55 cm) was observed in plants grown in red soil under coconut tree shade.

As evident from above, growing medium comprising red soil: palm oil mill effluent sludge (POME sludge) (1:2) showed the tallest plants as compared to red soil: POME sludge (1:1), red soil: POME sludge (2:1) and red soil alone. Thus, it could be inferred that the difference was higher because of a higher uptake of nutrients leading to optimal plant growth. These outcomes closely matched with the findings of Kameswari *et al.* (2014).

Similarly, among locations with various light regimes, plants growing inside the room were found taller than the plants growing on staircase, corridor and under coconut tree shade. Narmhikaa (2017) observed that plant height decreased with increasing light intensity and reported that low light level maintained maximum photosynthesis. Thus, higher light intensity could have reduced photosynthesis and eventually the plant growth.

Table 1 : Plant height (cm) as influenced by growing media, light regime and their interactions in philodendron.

Growing Media (G)	Light regime (L)															
	30 days after planting				60 days after planting				90 days after planting							
	L ₁	L ₂	L ₃	L ₄	Mean	L ₁	L ₂	L ₃	L ₄	Mean	L ₁	L ₂	L ₃	L ₄	Mean	
G ₁ : RS + POMES (1:1)	21.03	21.55	22.55	19.55	21.17	23.55	24.29	27.15	21.34	24.08	29.45	30.15	32.15	25.65	29.35	
G ₂ : RS + POMES (1:2)	22.75	23.55	24.63	20.78	22.93	24.75	26.45	28.15	22.91	25.56	30.15	33.45	35.55	28.00	31.79	
G ₃ : RS + POMES (2:1)	19.90	20.45	21.78	19.35	20.37	22.95	21.23	26.55	20.45	22.79	27.15	29.15	30.15	25.00	27.86	
G ₄ : RS	18.25	19.25	21.00	18.55	19.26	20.09	22.50	22.55	21.56	21.67	26.88	27.95	26.55	23.55	26.23	
Mean	20.48	21.20	22.49	19.56	20.93	22.84	23.62	26.10	21.56	23.53	28.41	30.18	31.10	25.55	28.81	
Factors	SE (m)				CD at 5%				SE (m)				C.D. at 5%			
Growing media (G)	0.23				0.70				0.26				0.28			
Light regime (L)	0.23				0.70				0.26				0.28			
G×L	0.47				1.41				0.51				0.57			

Plant spread (cm²)

A perusal of data (Table 2) revealed that the influence of growing media, light regimes and their interactions on plant spread was found significant at all growth stages. It was found that the mean plant spread was 33.70 cm² at 30 DAP, which increased to 58.20 cm² at 90 DAP.

The growing medium containing red soil: palm oil mill effluent sludge (POME sludge) (1:2) (62.99 cm²) had the highest plant spread, followed by red soil: POME sludge (1:1) (61.02 cm²) at 90 DAP. Lowest plant spread (49.82 cm²) was recorded in red soil. Maximum plant spread (62.14 cm²) was exhibited by philodendron plants grown inside the room, followed by those on the staircase (60.32 cm²) at 90 DAP. The lowest plant spread was recorded under the coconut tree shade (53.05 cm²). Among the interactions, red soil: POME sludge + inside the room (1:2) (70.00 cm²) recorded highest plant spread followed by the red soil: POME sludge + inside the room (1:2) (64.01 cm²) at 90 DAP. The lowest plant spread (45.65 cm²) was recorded in the plants grown in red soil under coconut tree shade.

The above results indicated that red soil: POME sludge (1:2), recorded maximum plant spread followed by red soil: POME sludge (1:1). This might be due to sufficient supply of nutrients and micro nutrients in compost. Several reports summarized by Kanakaraju *et al.* (2016) indicated that heavy metals such as Fe>Ni>Zn>Mn>Cd>Cr>Cu availability in the POME sludge was enhanced by addition of organic matter or compost to the soil.

According to the light regime, the plant spread was maximum inside the room compared to other places. The light intensity within the room was comparatively lower than staircase, corridor and under coconut tree shade in descending order. The least plant spread was observed in brighter environment, among the four locations, which might be due to decreased absorption of photosynthetically active radiation, depreciating rate of photosynthesis in contrast to shady locations. The findings in the present study are also in consonance with those reported by Thakur *et al.* (2019).

Number of leaves

The data pertaining to number of leaves recorded at 30, 60 and 90 DAP revealed significant differences among the growing media, light regimes and their interactions as presented in Table 3. The mean number of leaves increased from 6.49 at 30 DAP to 14.82 at 90 DAP.

Influence of growing media revealed that the medium comprising red soil: POME sludge (1:2) had maximum

Table 2 : Plant spread (cm²) as influenced by growing media, light regime and their interactions in philodendron.

Growing Media (G)	Light regime (L)																			
	30 days after planting				60 days after planting				90 days after planting											
	L ₁	L ₂	L ₃	L ₄	Mean	L ₁	L ₂	L ₃	L ₄	Mean	L ₁	L ₂	L ₃	L ₄	Mean					
G ₁ : RS + POMES (1:1)	34.00	35.25	36.00	33.25	34.63	54.68	56.35	57.82	52.20	55.26	61.08	61.72	64.01	57.55	61.02					
G ₂ : RS + POMES (1:2)	35.50	36.50	37.00	35.00	36.00	56.35	58.50	60.50	54.90	57.56	61.13	63.51	70.00	57.33	62.99					
G ₃ : RS + POMES (2:1)	32.00	33.50	35.50	30.00	32.75	54.03	54.98	58.06	46.88	53.49	59.56	60.61	63.75	51.68	58.97					
G ₄ : RS	30.50	32.50	34.50	28.25	31.44	50.25	52.35	55.50	45.35	50.86	47.38	55.43	50.82	45.65	49.82					
Mean	33.00	34.44	35.75	31.63	33.70	53.83	55.54	57.97	49.83	54.29	57.29	60.32	62.14	53.05	58.20					
Factors	SE(m)				SE(m)				SE(m)				CD at 5%							
Growing media (G)	0.43				0.56				1.70				0.62							
Light regime (L)	0.43				0.56				1.70				0.62							
G × L	-				N/A				3.40				1.24							
RS: red soil	POMES: palm oil mill effluent sludge				L ₁ : corridor				L ₂ : staircase				L ₃ : inside the room				L ₄ : coconut tree shade			

number of leaves (17.54) followed by red soil: POME sludge (1:1) (15.02) at 90 DAP. Minimum number of leaves was observed in red soil (12.73). Philodendron plants grown inside the room developed significantly greater number of leaves (17.05) followed by those on staircase (15.08) at 90 DAP. Number of leaves recorded by the plants grown under coconut tree shade was found minimum (13.04). The interactions between growing media and light regimes revealed that maximum number of leaves was registered by the combination of red soil: POME sludge + inside the room (1:2) (20.15) which was on par with red soil: POME sludge + inside the room (1:1) (18.55) at 90 DAP. Similarly, plants grown red soil under coconut tree shade recorded the least number of leaves (11.99).

The results indicated that maximum number of leaves were recorded in philodendron plants placed in the medium containing red soil and POME sludge in 1:2 proportion. These findings coincided with those reported by Rajan *et al.* (2020), who reported adequate availability of nitrogen in growing medium significantly influenced plant growth and increased number of leaves. Higher content of organic matter was shown to have an ability to store and release the plant nutrients for longer period resulting in maximum leaf area.

The philodendron plants which were kept inside the room exhibited the highest number of leaves. The light intensity inside the room was relatively low compared to other places, such as corridor, stair case and under coconut tree shade these findings are coincided with the of Gaurav *et al.* (2015) as number of leaves increased due to high leaf chlorophyll content and photosynthetic rate especially at optimum shade level.

Visual plant grade

The effect of growing media, light regimes and their interactions was tested significant for visual plant grade (90 DAP) as presented in Table 4.

Maximum visual plant grade (3.86) was observed in red soil : POME sludge (1:2) followed by red soil : POME sludge (1:1) (3.53). Minimum visual plant grade (2.55) was observed in red soil alone. Philodendron plants, which were placed inside the room exhibited the highest visual plant grade (3.84) followed by staircase (3.50) whereas, the lowest visual plant grade (2.56) was observed under coconut shade. With respect to treatment combinations, maximum visual plant grade (4.50) was observed in the combination of red soil: POME sludge (1:2) + inside the room followed by red soil: POME sludge (1:1) + staircase (3.95). Minimum visual plant grade (2.40) was recorded in plants grown red soil + under coconut tree shade.

Table 3 : Number of leaves as influenced by growing media, light regime and their interactions in philodendron.

Growing Media (G)	Light regime (L)														
	30 days after planting				60 days after planting				90 days after planting						
	L ₁	L ₂	L ₃	L ₄	Mean	L ₁	L ₂	L ₃	L ₄	Mean	L ₁	L ₂	L ₃	L ₄	Mean
G ₁ : RS + POMES (1:1)	6.20	6.50	7.65	5.90	6.56	12.33	14.55	15.55	11.88	13.58	14.00	14.43	18.55	13.09	15.02
G ₂ : RS + POMES (1:2)	7.00	7.60	7.70	7.10	7.35	13.95	14.96	16.05	13.55	14.63	16.55	17.70	20.15	15.76	17.54
G ₃ : RS + POMES (2:1)	5.59	6.10	7.35	5.20	6.06	12.03	12.55	14.12	10.25	12.24	13.55	15.57	15.53	11.32	13.99
G ₄ : RS	5.55	6.00	7.00	5.40	5.99	11.25	11.33	11.47	10.00	11.01	12.32	12.65	13.98	11.99	12.73
Mean	6.09	6.55	7.43	5.90	6.49	12.39	13.35	14.30	11.42	12.86	14.11	15.08	17.05	13.04	14.82
Factors	SE (m)	C.D. at 5%			SE (m)	C.D. at 5%			SE (m)	C.D at 5%					
Growing media (G)	0.15	0.45			0.28	0.86			0.31	0.95					
Light regime (L)	0.15	0.45			0.28	0.86			0.31	0.95					
G × L	-	N/A			0.57	1.71			0.63	1.89					

Table 4 : Visual plant grade and colour grade as influenced by growing media, light regime and their interactions in philodendron.

Growing Media (G)	Light regime (L)									
	Visual plant grade (90 DAP)					Visual colour grade (90 DAP)				
	L ₁	L ₂	L ₃	L ₄	Mean	L ₁	L ₂	L ₃	L ₄	Mean
G ₁ : RS + POMES (1:1)	3.18	3.65	3.95	2.98	3.53	3.18	3.65	3.95	2.98	3.53
G ₂ : RS + POMES (1:2)	3.75	3.80	4.50	3.28	3.86	3.75	3.80	4.50	3.28	3.86
G ₃ : RS + POMES (2:1)	3.05	3.35	3.58	2.73	3.22	3.05	3.35	3.58	2.73	3.22
G ₄ : RS	2.95	3.20	3.35	2.40	2.55	2.95	3.20	3.35	2.40	2.98
Mean	3.23	3.50	3.84	2.56	3.29	3.23	3.50	3.84	2.84	3.40
Factors	SE (m)		CD at 5%			SE (m)		CD at 5%		
Growing media (G)	0.09		0.27			0.09		0.27		
Light regime (L)	0.09		0.27			0.09		0.27		
G×L	0.18		0.53			0.18		0.53		

RS: red soil POMES: palm oil mill effluent sludge L₁: corridor L₂: staircase L₃: inside the room L₄: coconut tree shade

Visual colour grade

The influence of growing media, light regimes and their interactions was found significant in respect of visual colour grade at 90 DAP (Table 4).

The growing medium red soil : POME sludge (1:2) exhibited the most superior visual colour grade (3.86) followed by red soil : POME sludge (1:1) (3.53). Plants were found to show the poorest visual colour grade (2.98) when red soil was the exclusive growing medium. Among light regimes, the plants grown inside the room were found to possess the highest visual colour grade (3.84) followed by those grown on staircase (3.50). However, the lowest visual colour grade (2.84) was observed under coconut tree shade. As regards to treatment combinations, highest visual colour grade (4.50) was registered by the plants grown in red soil : POME sludge (1:2) + inside the room followed by red soil : POME sludge (1:1) + staircase (3.95); whereas, the lowest visual colour grade (2.40) was observed in plants grown in red soil under coconut tree shade.

It was evident that growing medium of red soil : POME sludge (1:2) recorded maximum visual plant grade, visual colour grade significantly superior to other medium with red soil : POME sludge (1:1), red soil : POME sludge (2:1) and red soil alone. POME sludge compost had more nutrient contents, photosynthetic rate, chlorophyll content as evident from data recorded in these respective parameters. This would have led to increased synthesis of enzymes and other essential proteins maintaining good health and thus leading to a higher visual plant grade as was reported in aglaonema cv. Ernesto's Favourite (Swetha *et al.*, 2014). Ikram *et al.* (2012) revealed that these plant-based composts improved quality in cut flowers leading to maximum vase life in tuberose.

The philodendrons which are placed inside the room has good quality parameters like visual plant, colour grade which might be due to low light intensity as compared to other locations viz., corridor, stair case and under coconut tree shade. Hatem *et al.* (2007) observed that ornamental plants under low light intensity recorded better quality parameters such as visual plant grade, visual colour grade.

Conclusion

Among various growing media, red soil : palm oil mill effluent sludge (POME sludge) (1:2) recorded maximum plant height followed by red soil : POME sludge (1:1), by red soil : POME sludge (2:1), red soil medium alone. However, the effect of light regime showed that the tallest plants inside the room followed by those placed on staircase, corridor and under coconut tree shade. Similarly, other parameters such as plant spread, number of leaves, visual plant and colour grade shows maximum when the plants were placed in media comprising red soil : POMES (1:2) and inside the room.

Acknowledgements

The authors would like to thankful to Dr. YSR Horticultural University, Venkataramannagudem, Andhra Pradesh for financial and technical support and providing necessary facilities during the present investigations.

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