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Effect of different media incorporated with Pusa hydrogel on growth and watering frequency of potted foliage plant, Arrowhead (*Syngonium podophyllum* Schott.)

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Abstract

To study the effect of Pusa hydrogel incorporated growing media on morphological characters of *Syngonium podophyllum* under various watering frequencies, an experiment was conducted in the Horticultural college and Research Institute, Periyakulam, Theni (Tamil Nadu). The treatments were eleven with the composition of basic pot mixture (sand, red soil and FYM at the ratio of 1:1:1), coco peat and Pusa hydrogel. The results revealed that, the media with a composition of 75% pot mixture + 25% coco peat+3g hydrogel /kg of potting media is found to be the optimum medium for potted foliage plant of *Syngonium podophyllum*. The watering frequency has been altered corresponding to potting media composition and in the other hand the potting media also influenced the morphological character of the plant. This study has proved that hydrogels in potting media improves the water availability and decreases the watering frequency.

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Introduction

Arrowhead Plant (*Syngonium podophyllum*) is one of the well-known and versatile indoor foliage plant. Owing to its beautiful variegated leaves and their adaptability to various growing conditions viz., low light intensity, it is one of the most suitable plant for interiorscaping for the places like staircase, windowsill etc (Davison

1998). Hydrogel is a hydrophilic polymer that has a wide arena of applications and during late 1980's; it was exclusively designed for agricultural use. It also performs well at higher temperatures (40–50°C) and hence are suitable for semi-arid and arid regions. They have the capacity of absorbing a minimum of 400 times of their dry weight

of pure water and gradually release the water according to the needs of the crop plant and also assists in aeration, drainage, improved physical properties of media, reduced water requirements, helps the plant to withstand prolonged moisture stress, better root development and increased yields. As they are neutral in pH, they do not affect nutrient availability, soil chemical composition and action of other agro chemicals, viz., fertilizers, herbicides, fungicides and insecticides.

Thus, based on the positive attributes of hydrogels, the following study was carried out to know the influence of hydrogels

incorporated with media on vegetative characters of arrowhead plant under various watering regimes.

Materials and Methods

The present investigation was carried out at Eastern block, Horticultural College and Research Institute, Periyakulam during the year 2017-18 in Complete Randomized Design with 11 treatments replicated thrice. The pots were filled with common potting mixture comprised of red soil, FYM and sand in the ratio of 1:1:1. Coco peats are hydrogel was incorporated with potting mixture at the per cent of 25, 50 and 75 and 3, 4 and 5 g per kg of potting media, respectively.

Table 1. Details of treatments used in experiments (Table 1).

Treatments	Details of treatments
T ₁	Pot mixture (sand, red soil and FYM at the ratio of 1:1:1)
T ₂	Pot mixture + 3g hydrogel /kg of potting media
T ₃	Pot mixture + 4g hydrogel /kg of potting media
T ₄	Pot mixture + 5g hydrogel /kg of potting media
T ₅	Pot mixture 75% + coco peat 25%
T ₆	Pot mixture 50% + coco peat 50%
T ₇	Pot mixture 25% + coco peat 75%
T ₈	Pot mixture 75% + coco peat 25% + 3g hydrogel /kg of potting media
T ₉	Pot mixture 50% + coco peat 50% + 4g hydrogel /kg of potting media
T ₁₀	Pot mixture 25% + coco peat 75% + 5g hydrogel /kg of potting media
T ₁₁	Coco peat 100%
Two months old tissue cultured plants of <i>Syngonium podophyllum</i> cv. White Butterfly was used for the research. The morphological parameters were recorded on 30, 60, 90 and 120 days after planting. Watering interval was determined based on moisture percentage determined by moisture probe (Fig. 1).

Fig. 1 The effect of different media with Pusa hydrogel on growth of *Syngonium podophyllum*

Results and Discussion

The results showed that the effect of watering intervals and application of hydrogel with potting mixture on most of the evaluated parameters were significant. The interaction effects of watering intervals and hydrogel was also significant with regard to different vegetative parameters of the plant (Table.1). The treatment T₃ (Pot mixture + 4g hydrogel /kg of potting media) has recorded the maximum plant height (68.45cm) and plant spread (37.20cm), whereas plant height and plant spread was minimum (28.57 cm and 23.11cm respectively) in treatment T₁₁ (Coco peat 100%). The clump girth was maximum (17.93 cm) in the treatment T₂ (Pot mixture + 3g hydrogel /kg of potting media) and minimum in treatment T₁₁ (6.18 cm).

This may be due to the presence of essential nutrients in higher amount in T₃ than T₁₁ which has a direct influence on plants vegetative growth. The treatment T₁ (Pot mixture 100%) had the higher number of leaves (55.85) compared to treatment T₁₁ (Coco peat – 100%) which had lesser number of leaves (18.00) (Fig.2). Root length was found to be maximum (131.08 cm) in treatment T₂ and it was minimum (59.76 cm) in treatment T₁₁. The number of primary roots per plant was maximum in the treatment with pot mixture (100%) whereas lesser number of primary roots was found in T₁₁ (coco peat 100%) which may be due to the lack of nutrients in required quantity in the latter treatment.

Fig. 2 Effect of different media incorporated with Pusa hydrogel on growth and watering frequency of *S. podophyllum*

Verdonck et al. (1983) recommended that, for optimal growing conditions for

Table 2. Effect of different media incorporated with Pusa hydrogel on growth and watering frequency of *S. podophyllum*

Treatment	Plant height (cm)	Root length (cm)	Number of primary roots	Clump girth (cm)	Plant spread (cm)	Number of leaves	Watering frequency (Days)	Visual score (1-100)
T ₁	67.23	120.47	55.92	17.40	35.62	55.85	12.40	73.61
T ₂	65.23	131.08	55.44	17.93	32.54	52.49	23.71	62.68
T ₃	68.45	101.91	56.15	15.95	37.20	49.87	27.10	79.04

plants, 30- 45% of the water held in a root media should be easily to the plants. Differences in available water holding capacity among media could be due to their total porosity and types of pores. Compared to the pot mixtures commercially used, coco peat has high porosity (Awang 2009). Presence of higher amount of fiber in coco peat correlates with low wettability. In this experiment, it was recorded that the interval of watering was minimum in T₁ (12.40 days) whereas it was maximum in T₁₁ (53.64 days). From this, it is evident that water-retention capacity of pot mixture is comparatively lesser than that of coco peat. In addition to cocopeat, hydrogel also possess the nature of higher water holding ability which in turn reduces the watering frequency. This in accordance with the results of Abedi-Koupai & Asadkazemi 2006 which showed that the application of hydrogel (A200) @ 4g per kg of soil that reduced the required water level to 33% less than control in *Cupressus arizonica*. T₈ (Pot mixture 75% + coco peat 25% + 3g hydrogel /kg of potting media) has ranked the highest score (85.89) in visual appearance (Beck et al. 1985).

T ₄	61.20	129.00	56.79	15.15	42.13	51.97	32.31	67.76
T ₅	40.20	96.77	49.13	8.01	30.17	38.42	22.57	80.39
T ₆	35.60	91.25	49.90	7.41	26.30	29.51	27.22	63.66
T ₇	31.20	92.27	37.91	6.34	25.31	25.20	32.85	54.19
T ₈	36.80	86.32	40.54	8.36	29.74	34.20	39.37	85.89
T ₉	33.50	68.53	37.89	7.58	27.52	35.14	42.52	75.16
T ₁₀	29.40	67.79	33.69	7.25	24.70	25.48	47.57	64.00
T ₁₁	28.57	59.76	32.88	6.18	23.11	18.00	53.64	57.48
Mean	45.22	95.01	46.02	10.69	30.39	37.83	32.84	
SEd	1.19	1.92	0.92	0.25	0.64	0.97	0.57	
CD (0.05)*	2.46	3.98	1.90	0.52	1.32	2.00	1.18	
CD (0.01) **	3.34	5.40	2.59	0.71	1.80	2.72	1.60	
CV %	3.21	2.47	2.44	2.88	2.57	3.13	2.12	

** Significant at 1% level

* Significant at 5% level

Conclusion

In general, indoor potted foliage plants are preferred with optimum growth and reduced less watering frequency. The results of this experiment indicated that availability of nutrient in potting media influenced the vegetative growth of *Syngonium podophyllum* significantly whereas inert media *i.e.*, cocopeat reduced the plant growth. Besides per cent of coco peat and hydrogel in potting media decreased the watering frequency. Thus it has been found that the treatment, T₈ (Pot mixture 75% + coco peat 25% + 3g hydrogel /kg of potting media) is the best suitable treatment for *Syngonium podophyllum* as an indoor foliage plant with 39.37 days watering frequency.

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