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INFLUENCE OF MEDIUM, CONTAINER SIZE AND WATER REGIME ON GROWTH OF PELLIONIA PULCHRA N. E. BR. AND PILEA INVOLUCRATA (SIMS) URB.[1]

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Abstract. **Plants watered 2 or 3 times a week grew better than plants misted every half-hr during daylight. Plant ht increased as pot size increased but root grade was unaffected. Plants growing in peat/perlite were slightly taller and had better roots than plants growing in peat/sand. The 7/1 ratio of peat/perlite produced slightly greater plant ht than 5/1 or 3/1, but ratio did not affect root grade of plants growing in the peat/perlite combination.**

There are many combinations of potting media used to grow foliage plants (1, 2, 6, 9, 10, 11, 12, 14, 16). Two combinations frequently used are peat/sand and peat/perlite. Size of containers influence physical characteristics of the media (14, 15) as well as growth of plants (3). Watering frequency has influenced plant response to potting media (4, 13). Physical characteristics of potting soils have also influenced plant growth (1, 6, 11).

Objectives of this research were to determine influences of potting medium, container size and watering regimes on growth and root grade of 2 foliage plants that had previously shown growth suppression in commercial operations when grown too wet.

Materials and Methods

Two experiments, 6x4x3 factorial of medium x container size x watering regime, were initiated July 25, 1974 and terminated August 29, 1974. One rooted 4-6 leaf cutting of *Pilea involucrata* or *Pellionia pulchra* was planted in either a 1.75, 2.25, 3.0 or 4.0 inch pot and placed in a glass house with temp of 70-100°F where they received 1,000-1,500 ft-c. Pots contained German peat/perlite or peat/sand combinations at ratios of 3/1, 5/1 or 7/1 (v/v). To each yd^3 of soil mix was added 1 lb. Perk, 5 lb. 14-14-14 Osmocote and 7 lb. dolomite. Plants were watered either by mist, 15 sec every half-hr during daylight or by hand 2 or 3 times/week. There were 10 replications/treatment.

Data collected at experiment termination included ht and root grade (based on a scale of 1-5 where 1 = no roots and 5 = very thick root ball) and soluble salts, using 2/1 (v/v) water/soil mix, pH, cation exchange capacity, bulk density, water holding capacity and non-capillary air space for each medium.

Results and Discussion

Plants watered by mist had lowest ht and poorest root grade (Table 1). Dickey et al. (4) reported 3 woody ornamental plants growing in a peat/sand/perlite (v/v/v) mix and watered every 3 or 6 days were larger than those watered every day. Plant ht increased as pot size increased, but root grade was unaffected. Non-capillary air space increased with increases in pot size indicating increased growth may be due to increased aeration (Table 2). Other researchers (7, 14, 16) stressed the importance of free water drainage and aeration when considering watering practices and media in various sized pots. Plants growing in the larger pots also had more available fertilizer since the rate was based on volume. Plants in peat/perlite mixes were slightly taller with a better root grade than plants in peat/sand combinations. The 7/1 ratio produced slightly better plants than the 5/1 or 3/1 ratio. There was slightly more non-capillary air space in the peat/sand mixes and air spaces increased slightly with an increase in pot size (Table 2). The low air space of all mixes is the probable cause of the poorer growth of plants watered by mist and emphasizes the patricular importance of proper soil aeration and irrigation practices when growing plants in small containers. Paul and Lee (8) found 10-15% air space related to best growth of chrysanthemums in 5 inch containers when water was maintained near container capacity. Furuta (5) suggests 5% air space after drainage for container grown nursery stock which are usually planted in gallon or larger cans.

Soluble salts of all media (Table 3) were acceptable (15). The pH was slightly low, but not excessively so (2, 6). Cation exchange capacity of peat/perlite mixes was approx

Table 1. Influence of watering regime, potting mix and pot size on growth of *Pellionia pulchra* and *Pilea involucrata*.

Water regime	*P. pulchra* Plant ht (cm)	*P. pulchra* Root grade[y]	*P. involucrata* Plant ht (cm)	*P. involucrata* Root grade
Mist	13.5 a[z]	2.6 a	11.4 a	2.7 a
Twice/wk	15.8 b	3.3 b	13.6 c	3.2 b
Thrice/wk	15.9 b	3.6 b	12.4 b	3.6 c
Pot size (in)				
1.75	10.6 a	3.3 a	8.6 a	3.2 a
2.25	14.6 b	3.2 a	12.0 b	3.1 a
3.00	16.8 c	3.2 a	14.1 c	3.1 a
4.00	18.3 d	3.1 a	15.1 d	3.0 a
Potting mix (v/v)				
Peat/Perlite (3/1)	15.4 b	3.5 c	11.8 a	3.3 bc
Peat/Perilte (5/1)	14.9 b	3.6 c	12.5 b	3.4 bc
Peat/Perlite (7/1)	16.7 c	3.4 bc	13.4 c	3.5 c
Peat/Sand (3/1)	14.8 b	3.2 b	11.7 a	2.7 a
Peat/Sand (5/1)	13.6 a	2.7 a	12.6 b	2.7 a
Peat/Sand (7/1)	15.0 b	2.8 a	12.8 b	3.1 b

[z]Mean separation within columns in each group by Duncan's multiple range test, 5% level.
[y]Based on a scale of 1 to 5 where 1 = no roots and 5 = very thick root ball.

Table 2. Non-capillary air space (%) of various potting media in various pot sizes.

Potting media (v/v)	Pot size (in) 1.75	2.25	3.00	4.00	Avg
Peat/Perlite (3/1)	5	6	9	12	8.0
Peat/Perlite (5/1)	6	6	9	11	8.0
Peat/Perlite (7/1)	6	7	8	10	7.8
Peat/Sand (3/1)	7	9	11	11	9.5
Peat/Sand (5/1)	8	11	11	10	10.0
Peat/Sand (7/1)	7	10	12	12	10.2

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double that of peat/sand ones indicating the necessity of more frequent fertilization of the peat/sand mix. Bulk density of peat/perlite medium was approx one-fourth that of peat/sand media. The difference between water holding capacity was considerable (Table 4) when considering water holding capacity as % wt, but there was very little difference when water holding capacity was expressed as % volume. Water holding capacity decreased as pot size increased. This was more characteristic of the peat/perlite mixes than peat/sand. Moisture retention in containers is a function of container depth (12) but the decrease in water holding capacity with increase in container size is much more evident when determining water holding capacity as % wt. When measuring water holding capacity as % volume, the difference is much less evident. Joiner and Conover (6) reported the primary growth of chrysanthemums in various media and related differences to water availability. However, % available water by volume varied from 13 to 64 in their experiment, but variation was only 71 to 88 in soil media reported in these experiments.

Table 3. Characteristics of potting media.

Potting media (v/v)	Soluble salts (ppm, 2/1, v/v)	pH	CEC meq/ 100 g	CEC meq/ 100 cc	Bulk density g/cc
Peat/Perlite (3/1)	616	4.9	28	3.1	.11
Peat/Perlite (5/1)	595	5.4	27	2.7	.10
Peat/Perlite (7/1)	822	5.5	26	2.6	.10
Peat/Sand (3/1)	665	5.2	10	5.2	.52
Peat/Sand (5/1)	693	5.3	11	4.8	.44
Peat/Sand (7/1)	833	5.2	11	4.6	.42

Table 4. Water holding capacity (%) of various potting media in various pot sizes.

Potting media (v/v)	Pot size (in) 1.75 wt	1.75 vol	2.25 wt	2.25 vol	3.00 wt	3.00 vol	4.00 wt	4.00 vol
Peat/Perlite (3/1)	712	79	676	83	656	86	469	74
Peat/Perlite (5/1)	778	82	732	87	675	88	559	77
Peat/Perlite (7/1)	769	80	677	83	588	81	443	70
Peat/Sand (3/1)	185	74	169	79	164	81	160	76
Peat/Sand (5/1)	161	71	164	76	161	77	157	72
Peat/Sand (7/1)	177	75	166	76	165	80	164	75

Although peat/perlite (7/1) mixes appear best for these plants grown under conditions of these experiments, there is no indication of reasons for this from an examination of the various soil characteristics. Soluble salts and non-capillary air space was lowest in such mixes, but differences between the lowest and highest were not large. Water holding capacity, pH and cation exchange capacity were intermediate for the peat/perlite (7/1) mix. Evidently, a combination of factors contributed to the better growth in the peat/perlite mix.

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