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WOODCHIP SLUDGE COMPOST AS AN INGREDIENT OF POTTING MIXTURES FOR FOLIAGE PLANTS

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Abstract. ***Brassaia actinophylla* Endl., *Chrysalidocarpus lutescens* H. Wendl., *Dieffenbachia maculata* (Lodd.) G. Don 'Camille', and *Peperomia obtusifolia* (L.) A. Dietr. were grown in 3 soil mixes with various levels of a woodchip sludge compost (Compro) incorporated. *Brassaia, Chrysalidocarpus,* and *Peperomia* grew equally in all levels of Compro. Compro did not affect top growth or quality of *Dieffenbachia,* but an increase in Compro decreased root grade. Growth of *Chrysalidocarpus* and *Brassaia* was equal in the 3 mixes, but the 3:1 peat:sand mix was slightly better for *Dieffenbachia* and *Peperomia.* Additions of Compro changed medium physical characteristics, but not to the betterment or detriment of plant growth.**

Many publications have been printed describing effects of potting medium ingredients on growth of a large variety of container grown plants. However, the number of publications describing physical and chemical characteristics of these media and correlation of these characteristics to plant growth is limited. In 1965, Joiner and Conover (6) described the value of expressing cation exchange capacity (CEC) and water holding capacity (WHC) on a volume instead of a weight basis. A few years later, research showed that various amendments added to soil changed both physical characteristics and plant growth (9). Waters et al. (10) showed that changing the ingredients of a container could greatly alter soil physical characteristics. Since then, other publications have related soil physical characteristics to growth responses of plants (2, 3, 4, 5, 7). Suggested standards for potting media used to grow foliage plants were published in 1981 (8). A recent publication indicated Compro (a woodchip sludge compost) could be used as a satisfactory ingredient of potting media (1). Experiments reported here were conducted to determine growth of 4 foliage plants in various potting media with different levels of Compro incorporated and the physical characteristics of these media.

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Materials and Methods

Experiment 1. A 3 x 5 factorial experiment in randomized block design with 6 replications was established 24 June 1982 using rooted *Dieffenbachia maculata* or *Peperomia obtusifolia* in 15-cm pots. The 3 base potting media were: 3 Florida peat:1 builder's sand; 2 Florida peat:1 pine bark:1 cypress shavings; and 1 Florida peat:1 pine bark (v/v). Five woodchip sludge compost levels were 0, 10, 20, 30 and 40% of the above media. The resulting 15 potting media were amended with 1 kg/m^3 MicroMax (Sierra Chemical Co., Milpitas, CA 95035) and 4 kg/m^3 dolomite. A slow release fertilizer (19-3-10, N-P-K, [Sierra Chemical Co., Milpitas, CA 95035]) was surface applied at 2 g/pot for *Peperomia* and 3.3 g/pot for *Dieffenbachia,* 24 June and 26 Sep. 1982. Plants were maintained in a greenhouse receiving 1500 fc maximum light with temper-

atures ranging from 18° to 35°C and irrigated 2 or 3 times weekly. Growth measurements were recorded 27 Oct. 1982. The following data were determined: plant height; plant quality, rated on a 1 (poor, not salable) to 5 (excellent quality) scale; and root grade rated on a 1 (0-20% root ball coverage) to 5 (81-100% root ball coverage) scale.

Experiment 2. Treatments were the same as Expt. 1. *Brassaia actinophylla* and *Chrysalidocarpus lutescens* were placed in 20-cm pots 9 July and fertilized with 8.5 g and 7.0 g respectively, of 19-3-10 slow release fertilizer 9 July and 14 Oct. 1982. Plants were grown in a shadehouse receiving 12,000 fc maximum light with temperatures ranging from 10 to 37° C. Growth data for *Brassaia* were taken 8 Dec. 1982 and data taken 8 Feb. 1983 for *Chrysalidocarpus*. Plant height and quality were determined as well as foliar color graded on a 1 (light green) to 5 (dark green color) scale.

Results and Discussion

Soil physical data. CEC, WHC, bulk density (BD), pH, soluble salts (SS), % capillary pore space (% CPS) and % non-capillary pore space (% NCPS) were determined initially. At termination of Expt. 1, WHC and % NCPS were determined for media with *Peperomia* and *Dieffenbachia* and for pots with no plants that had been watered and fertilized the same as *Peperomia* and *Dieffenbachia* pots. Analytical procedures were described previously (6) except SS and pH which were determined from a 2:1 mix by volume of water:soil.

Dieffenbachia and *Peperomia* grown in 3 Florida peat:1 builder's sand were slightly taller and of higher quality than plants grown in the 2 other mixes, but root grade was reduced (Table 1). *Brassaia* and *Chrysalidocarpus* grew equally in the 3 media (data not shown). Additions of Compro to these potting media had no influence on height or quality of plants, with all plants of good quality (data not shown). Other research has shown that good quality plants can be grown in a variety of media (1, 2, 4, 6, 7).

Table 1. Response of foliage plants grown in various media, 24 June to 27 Oct. 1982.

	Dieffenbachia 'Camille'			*Peperomia obtusifolia*		
Soil mix	Plant ht (cm)	Plant grade[z]	Root grade[y]	Plant ht (cm)	Plant grade[z]	Root grade[y]
3:1[x]	40a[w]	5.0a	4.4ab	28a	4.4ab	4.0b
2:1:1	38b	4.7b	4.3b	24b	3.9b	4.2ab
1:1	37b	4.6b	4.6a	25b	4.1ab	4.3a

[z]1 = poor, not salable, 5 = excellent quality.
[y]1 = 0-20% root ball coverage, 5 = 81-100% coverage.
[x]3 Florida peat:1 builder's sand (v/v); 2 Florida peat:1 cypress shavings: 1 pine bark (v/v/v); 1 Florida peat:1 pine bark (v/v).
[w]Mean separation within columns by Duncan's multiple range test, 5% level.

Soil characteristics. Compro influenced CEC, BD, WHC, and CPS. Only NCPS was unaffected by additions of Compro. The most significant comparison was cubic for soil physical characteristics. CEC and WHC decreased at the 10% level of Compro, increased to 30% Compro, and then decreased. Although BD and CPS were also cubic, 10% Compro and 50% Compro had the highest values (Table 2). Several interactions occurred. Compro had the most effect on the peat:sand mix, only slight effect on the peat:shavings:bark mix and no effect on the peat:bark mix. As the level of the bark increased in the basic media, the effect of Compro lessened. Characteristics differed among the 3 basic mixes. The 3 peat:1 sand mix had the least CEC and NCPC, but the highest BD and CPS. All soil characteristics were near the standards suggested for potting media used to grow foliage plants (8), except CPS was slightly high.

WHC of pots without plants 4 months later was about the same as originally, but WHC of pots with *Peperomia* and *Dieffenbachia* growing in them was lower (Table 3). NCPS was less in the pots without plants, as well as pots containing *Peperomia* and *Dieffenbachia.* WHC of 2 peat:1 shavings:1 bark and 1 bark:1 peat decreased, but WHC of

Table 2. Soil characteristics of various mixes before plant growth, 10 June 1982.

% Compro	Cation exchange capacity (mg/100 cm³)	pH	Bulk density (g/cm³)	Water holding capacity % by vol	% capillary pore space	% non-capillary pore space	Micro mhos/cm
0	26	5.4	0.33	62	34	16	515
10	10	5.9	0.43	54	43	18	1002
20	10	6.2	0.36	60	36	16	1498
30	16	6.4	0.36	62	36	17	2428
40	15	6.6	0.42	57	42	17	3292
			% treatment sum of squares				
Linear	2	95**	14**	0	9	1	98**
Quadratic	45**[z]	4**	0	0	1	10	2
Cubic	52**	1	73**	94**	76**	40	0
Quartic	1	0	13**	6	14*	49	0
Soil mix[y]							
3:1	8c[x]	5.9a	.55a	59a	56a	12b	1650b
2:1:1	22a	6.1a	.29b	60a	29b	19a	1984a
1:1	16b	6.2a	.30b	58a	30b	20a	1606c

[z]* = 5% level of significance, ** = 1% level.
[y]3 Florida peat:1 builder's sand (v/v); 2 Florida peat:1 cypress shavings: 1 pine bark (v/v/v); 1 Florida peat:1 pine bark (v/v).
[x]Mean separation within columns by Duncan's multiple range test, 5% level.

Table 3. Soil characteristics of various mixes after plant growth, 27 Oct. 1982.

% Compro	% volume water holding capacity			% non-capillary pore space			Micro-mhos/cm		pH	
	Empty pots	*Peperomia*	*Dieffenbachia*	Empty pots	*Peperomia*	*Dieffenbachia*	*Peperomia*	*Dieffenbachia*	*Peperomia*	*Dieffenbachia*
0	56	47	39	16	18	16	172	84	6.6	6.7
10	60	49	40	18	23	19	274	115	6.6	6.7
20	62	49	45	18	19	20	312	163	6.6	6.6
30	59	47	40	16	20	19	344	208	6.7	6.6
40	55	48	40	14	17	17	380	171	6.8	6.7
				% treatment sum of squares						
Linear	14	1	4	26**[z]	17	11	93**	75**	33	17
Quadratic	38*	12	46	73**	38	88**	5**	14**	60	69
Cubic	2	65	0	0	16	1	2	1	7	7
Quartic	46*	22	50	1	29	0	0	10	0	7
Soil mix[y]										
3:1	58a[x]	66a	62a	10b	13c	19b	263a	177c	6.4a	6.5a
2:1:1	59a	39b	28c	19a	21b	12c	329c	149b	6.7b	6.7b
1:1	55b	39b	33b	20a	24a	24a	298b	118a	6.9c	6.7a

[z]* = 5% level of significance, ** = 1% level.
[y]3 Florida peat:1 builder's sand (v/v); 2 Florida peat:1 cypress shavings: 1 pine bark (v/v/v); 1 Florida peat:1 pine bark (v/v).
[x]Mean separation within columns by Duncan's multiple range test, 5% level.

3 peat:1 sand did not indicate a decomposition of organic matter. At the termination of the experiment, the 1 peat:1 bark medium had the highest NCPS.

Although some of the highest values were 2 to 3 times the lowest values of the various physical characteristics, there were only slight differences in growth characteristics indicating that plants of good quality can be grown in a large variety of mixes with large differences in soil characteristics.

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