Table 8. Interaction of Agrisoil™ x fertilizer on electrical conductivity (μmhos/cm²) of the leachate from *Dieffenbachia* 'Victory'™.

	Osmocote 19-2.6-10/15-cm pot[z]		
% AGRISOIL™	3 g	6 g	9 g
0.0	101	366	493
12.5	202	242	569
25.0	447	227	304
37.5	109	441	441
50.0	305	110	728
Significance			
Agrisoil™ *x* Fertilizer		P = 0.001 (***)	

[z]Applied 27 April, 1990

Table 9. Effects of vermiculite-perlite vs pine bark inclusion in peat-Agrisoil™ mixes on *Chamaedorea elegans* and *Dieffenbachia* 'Victory'™.

	Plant Grade[z]	Height Change (cm)	Final pH	Final EC (μmhos/cm²)
Chamaedorea elegans INCLUSION IN MEDIA				
25% vermiculite + 25% perlite	4.0	19.0	7.3	1174
50% pine bark	4.0	18.0	7.1	796
Significance[y]	NS	NS	NS	**
Dieffenbachia 'Victory'™				
25% vermiculite + 25% perlite	4.3	27.2	7.5	406
50% pine bark	4.1	26.0	7.3	276
Significance[y]	*	NS	NS	**

[z]1 = dead; 2 = poor quality, unsalable; 3 = fair quality, salable; 4 = good quality, salable; 5 = excellent quality
[y]Mean separation by Duncan's new multiple range test, 5% level

the small particle size and open matrix result in a material with extremely high surface area. This type of matrix is likely to cause rapid decomposition of the organic fraction of Agrisoil™ and may be responsible for reduced porosity in media with higher percentages of Agrisoil™.

Comparison of pine bark with vermiculite-perlite as the remaining 50% of the peat-Agrisoil™ mixture showed decreased EC with pine bark in both palms and dieffenbachia (Table 9). Medium porosity has been shown to affect retention of salts (1) and pine bark utilized in these experiments resulted in a more porous medium. The utilization of pine bark or vermiculite-perlite had no effect on change in height or final pH of either palm or dieffenbachia, but plant grade of dieffenbachia was slightly improved with vermiculite-perlite (Table 9). Lower EC, due to leaching of fertilizer, may have been responsible for this slight plant grade change.

The use of Agrisoil™ as a medium component appears to be feasible, but amounts which can be included in media to yield a quality crop may vary according to the crop grown.

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GROWTH OF PICKERELWEED IN MUNICIPAL SOLID WASTE COMPOST AND YARD TRASH COMPOST

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Additional index words. wetland plant, potting mix, shade levels.

Abstract. **Tissue culture liners of pickerelweed (*Pontederia cordata* L.), a native wetland plant, were grown in potting media of Metro 500 (100%), Metro 500:coarse yard trash compost (1:1), coarse yard trash compost (100%), Metro 500: fine yard trash compost (1:1), fine yard trash compost (100%), Metro 500:Agrisoil (1:1) or Agrisoil (100%), and supplied with 2.5, 5 or 10 g of Osmocote 18-6-12 per container. Plants were grown under 0, 30 or 50% shade in 15 cm azalea pots with constant subirrigation for 18 weeks. Plant height, number of inflorescences, fresh and dry wt. of leaves and roots were determined at experiment termination. The greatest number of inflorescences, fresh and dry weight were produced in 0% shade, while the tallest plants were produced in 50% shade. Best growth occurred with the highest fertilizer rate. Plant growth showed significant differences between potting mixes. The results showed that quality plants for aquascaping can be grown with composted yard trash or composted municipal solid waste as a potting mix component if adequate levels of N, P, K are available.**

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Pickerelweed (*Pontederia cordata* L), a Florida native wetland plant, usually grows in shallow water of 15 cm or less and is used for aquascaping and wetland mitigation. Presently most plants used for these purposes are removed from native stands. Commercial nursery production of this crop would prevent environmental degradation and be less expensive (considering collection costs and transplant loss). Only one reference was found by the authors which discussed cultural requirements of pickerelweed (5).

Florida's Solid Waste Management Act of 1988 will prohibit the disposal of vegetative matter from landscape maintenance practices (yard trash) in municipal landfills as of Jan. 1, 1992. Utilization of composted yard trash in potting mixes is one of several alternative uses for this material. Composted yard trash is currently produced and available from several sources in Florida, however, reports on its use as potting mix components have been limited (4). The legislation prohibiting the deposition of yard trash in municipal landfills was prompted by a shortage of geologically and politically satisfactory landfill sites. The landfill shortage has created a need for alternative disposal methods for not only yard trash but also total municipal solid waste. Limited studies during the fifties and sixties had shown that composted total solid municipal waste could be used as a partial component of the growth substrate for horticultural crops (1,2,3). Conover and Joiner (1) also reported that potting mixes with solid municipal waste compost as a component had an elevated maximum water content and high soluble salts: Composted municipal solid waste has been produced in quantity by at least two Florida firms since January 1990.

The objectives of this research were (1) to determine if composted yard trash and composted municipal solid waste could be used individually or in combination with a standard potting mix as a container plant growth substrate, (2) to determine nitrogen and shade level requirements of container grown pickerelweed, and (3) to determine if growth of a wetland plant (pickerelweed) would show a response to different media, if all media were kept constantly moist.

Material and Methods

Four week old tissue culture liners of pickerelweed were used to establish a 7 x 3 x 3 factorial experiment with six replications and a single plant as the experimental unit. Plants were potted in 15 cm containers using one of seven mixes [a) Metro 500 (100%); b) Metro 500:coarse yard trash compost (1:1); c) coarse yard trash compost (100%); d) Metro 500: fine yard trash compost (1:1); e) fine yard trash compost (100%), f) Metro 500:Agrisoil (1:1) or g) Agrisoil (100%)]. Metro 500 (W. R. Grace & Co., Cambridge, MA) is a commercial potting mix formulated with bark ash, composted pine bark, peat moss, sand, and vermiculite. Agrisoil (AgriPost, Inc. Pompano Beach, FL) is municipal solid waste that has been ground, screened and composted for 30 days. The coarse and fine yard trash composts (Recycled Wood Products, Tampa, FL) were produced by composting ground yard trash for 90 days and screening it into two categories: fine (1.0 cm or smaller) and coarse (1.0-1.6 cm). After potting, plants were transferred to shade houses with 50% or 30% shade or placed in full sun (0% shade) on a gravel bed. The containers were randomized in 52 x 26 x 6 cm greenhouse flats without drainage holes. Flats were hand watered as needed to maintain water levels between 1 and 6 cm. Plants were fertilized with either 2.5, 5 or 10 g per container of Osmocote 18-6-12 (N, P_2O_5, K_2O slow release fertilizer). All containers in the same flat received the same fertilizer rate. The experiment was initiated on April 23, 1990 and terminated the week of August 27, 1990 when plant height, number of inflorescences, fresh and dry weight were determined.

Results and Discussion

Simple effects were modified by interactions for all determined growth parameters (Table 1). In its native habitat, pickerelweed is most commonly seen in full sun sites. The decrease in number of inflorescences and fresh and dry weight as shade levels increased confirms these field observations. The increase in number of inflorescences and fresh and dry weight as fertilizer levels increased indicates a high nutritional requirement.

Since all growth parameters had shown interactions for all cultural factors, a Waller-Duncans means separation was used to evaluate the effect of the seven potting mixes in each light level at each fertilizer level (Table 2, 3, 4). In each shade level at each fertilizer rate, plants grown in Metro 500 had the greatest fresh and dry weights. Plants grown in 100% coarse yard trash compost had the lowest fresh and dry weights in eight of the nine shade and fertilizer levels.

At experiment termination plants grown in Metro 500 in 0% shade at the low fertilizer rate had an average fresh weight of 265 g while plants grown in coarse yard trash had an average weight of 72 grams (Table 2), making plants grown in Metro 500, 3.6 times as heavy as plants grown in coarse yard trash compost. At the high fertilizer rate plants grown in Metro 500 had an average fresh weight of 548 g while plants grown in coarse yard trash compost had an average fresh weight of 319 g making

Table 1. Main effects of three shade levels, three fertilizer rates and seven potting mixes on height, total number of inflorescences, fresh and dry weight of pickerelweed (*Pontederia cordata* L).

Variable	Plant Height (cm)	Number of Inflorescences	Fresh Wt (g)	Dry Wt (g)
Shade level				
0%	86.9	4.2	288.4	49.4
30%	83.9	1.5	260.6	43.1
50%	101.9	1.3	237.8	21.3
Significance	**[y]	**	**	**
Osmocote 18:6:12 g/15 cm pot/4 mo				
2.5	86.4	1.8	169.5	26.1
5.0	90.3	2.2	239.9	37.2
10.0	96.0	3.1	377.4	60.5
Significance	**	**	**	**
Potting Mix[z]				
Metro 500	94.5	3.7	395.8	70.0
Metro 500:CYTC (1):	94.5	3.1	307.1	48.9
CYTC	82.1	0.7	140.2	17.4
Metro 500:FYTC (1:1)	93.0	3.4	324.8	53.3
FYTC	91.4	2.6	252.9	40.9
Metro 500:Agrisoil (1:)	93.0	2.0	257.5	37.1
Agrisoil	87.4	1.1	157.6	21.4
Significance	**	**	**	**
Shade Level x Osmocote	**	**	**	**
Osmocote x Potting Mix	**	**	**	**
Potting Mix x Shade Level	**	**	**	**
Shade Level x Osmocote x Potting Mix	**	**	**	**

[z]CYTC = coarse yard trash compost, FYTC = fine yard trash compost.
[y]*,** = significant at the 5% level, and significant at the 1% level, respectively.

Table 2. Influence of fertilizer and potting mix on height, number of inflorescences, fresh and dry weight of pickerelweed (*Pontederia cordata* L.) grown in 0% shade.

Fertilizer Rate (g/Osmocote 18-6-12) 15-cm container	Potting Mix[z]	Ht. (cm)	Number of Inflor-escences	Fresh Wt. (g)	Dry Wt. (g)
2.5[y]	Metro 500	93.1^{a}	3.8^{bc}	265.4^{a}	48.2^{a}
	Metro 500:CYTC	89.7^{ab}	4.5^{ab}	218.1^{b}	39.2^{b}
	CYTC	65.4^{c}	0.3^{e}	72.2^{e}	9.9^{f}
	Metro:500:FYTC	82.3^{ab}	5.3^{ab}	219.2^{b}	41.2^{b}
	FYTC	85.4^{ab}	3.5^{bc}	183.7^{c}	32.8^{c}
	Metro 500:Agrisoil	79.2^{abc}	3.1^{cd}	158.3^{c}	25.1^{d}
	Agrisoil	76.8^{bc}	2.0^{d}	117.6^{d}	16.6^{e}
5.0[y]	Metro 500	87.2^{a}	5.3^{a}	374.3^{a}	70.3^{a}
	Metro 500:CYTC	96.8^{a}	5.7^{a}	309.4^{b}	52.6^{bc}
	CYTC	75.7^{a}	1.3^{d}	143.8^{e}	20.5^{e}
	Metro 500:FYTC	88.9^{a}	5.7^{a}	304.8^{b}	57.4^{b}
	FYTC	83.7^{a}	3.5^{bc}	209.9^{cd}	38.4^{d}
	Metro 500:Agrisoil	85.3^{a}	4.3^{ab}	240.3^{c}	41.0^{cd}
	Agrisoil	91.3^{a}	1.8^{cd}	156.9^{de}	21.5^{e}
10.0[y]	Metro 500	81.6^{a}	4.5^{ab}	548.3^{a}	103.7^{a}
	Metro 500:CYTC	93.3^{a}	7.7^{a}	463.0^{ab}	81.6^{ab}
	CYTC	93.3^{a}	3.8^{b}	318.9^{c}	47.2^{d}
	Metro 500:FYTC	86.1^{a}	7.8^{a}	526.6^{a}	91.3^{b}
	FYTC	90.4^{a}	6.2^{ab}	401.2^{bc}	71.2^{bc}
	Metro 500:Agrisoil	100.8^{a}	4.3^{ab}	451.5^{ab}	70.1^{bc}
	Agrisoil	97.8^{a}	3.5^{b}	374.6^{bc}	58.5^{cd}

[z]CYTC = Coarse yard trash compost, FYTC = Fine yard trash compost.
[y]Mean separation within columns of the same fertilizer rate by Waller-Duncan K-ratio t test (P = 0.05).

Table 3. Influence of fertilizer and potting mix on height, number of inflorescences, fresh and dry weight of pickerelweed (*Pontederia cordata* L.) grown in 30% shade.

Fertilizer Rate (g/Osmocote 18-6-12) 15-cm container	Potting Mix[z]	Ht. (cm)	Number of Inflor-escences	Fresh Wt. (g)	Dry Wt. (g)
2.5[y]	Metro 500	81.2^{ab}	1.3^{bc}	277.0^{a}	49.9^{a}
	Metro 500:CYTC	89.1^{a}	0.5^{cde}	218.4^{b}	32.5^{bc}
	CYTC	70.6^{a}	0.0^{e}	74.7^{d}	7.8^{e}
	Metro:500:FYTC	83.4^{a}	2.5^{a}	213.7^{b}	36.1^{b}
	FYTC	88.3^{a}	1.7^{ab}	175.0^{bc}	29.2^{c}
	Metro 500:Agrisoil	73.3^{ab}	1.0^{bcd}	147.6^{c}	20.8^{d}
	Agrisoil	70.9^{b}	0.3^{de}	90.6^{d}	11.6^{e}
5.0[y]	Metro 500	93.4^{a}	2.8^{a}	413.0^{a}	81.1^{a}
	Metro 500:CYTC	84.7^{a}	1.8^{abc}	298.4^{b}	49.6^{bc}
	CYTC	74.7^{a}	0.0^{d}	137.7^{c}	16.3^{e}
	Metro 500:FYTC	81.2^{a}	1.2^{bcd}	300.6^{b}	53.0^{b}
	FYTC	83.1^{a}	2.0^{ab}	241.2^{b}	38.5^{d}
	Metro 500:Agrisoil	84.6^{a}	1.3^{abcd}	239.3^{b}	35.7^{d}
	Agrisoil	80.3^{a}	0.3^{d}	127.2^{c}	17.3^{e}
10.0[y]	Metro 500	87.1^{a}	4.5^{a}	503.8^{a}	100.7^{a}
	Metro 500:CYTC	93.1^{a}	2.7^{b}	369.6^{c}	66.3^{bc}
	CYTC	87.3^{a}	0.2^{c}	199.0^{d}	22.1^{d}
	Metro 500:FYTC	92.3^{a}	3.7^{ab}	462.0^{ab}	77.9^{b}
	FYTC	87.0^{a}	2.2^{b}	392.3^{bc}	68.0^{bc}
	Metro 500:Agrisoil	93.3^{a}	2.2^{b}	373.7^{c}	59.5^{c}
	Agrisoil	83.7^{a}	0.2^{c}	217.4^{d}	30.7^{d}

[z]CYTC = Coarse yard trash compost, FYTC = Fine yard trash compost.
[y]Mean separation within columns of the same fertilizer rate by Waller-Duncan K-ratio t test (P = 0.05).

Table 4. Influence of fertilizer and potting mix on height, number of inflorescences, fresh and dry weight of pickerelweed (*Pontederia cordata* L.) grown in 50% shade.

Fertilizer Rate (g/Osmocote 18-6-12) 15-cm container	Potting Mix[z]	Ht. (cm)	Number of Inflor-escences	Fresh Wt. (g)	Dry Wt. (g)
2.5[y]	Metro 500	108.3^{a}	2.8^{a}	265.7^{a}	36.3^{a}
	Metro 500:CYTC	96.9^{b}	0.7^{bc}	194.4^{bc}	27.2^{bc}
	CYTC	82.8^{c}	0.0^{c}	52.2^{d}	5.1^{f}
	Metro:500:FYTC	103.3^{ab}	1.3^{b}	214.8^{b}	29.8^{ab}
	FYTC	96.3^{b}	0.8^{bc}	155.0^{c}	20.4^{cd}
	Metro 500:Agrisoil	104.5^{ab}	1.0^{bc}	154.3^{c}	18.5^{de}
	Agrisoil	94.3^{b}	0.5^{bc}	92.7^{d}	10.6^{ef}
5.0[y]	Metro 500	108.7^{a}	3.5^{a}	374.1^{a}	49.9^{a}
	Metro 500:CYTC	104.0^{a}	1.5^{bc}	273.3^{bc}	35.2^{b}
	CYTC	89.0^{a}	0.0^{d}	75.2^{e}	6.2^{d}
	Metro 500:FYTC	104.9^{a}	1.2^{bcd}	283.4^{b}	36.1^{b}
	FYTC	102.5^{a}	2.2^{b}	211.6^{d}	27.0^{c}
	Metro 500:Agrisoil	102.6^{a}	0.2^{d}	227.1^{cd}	24.2^{c}
	Agrisoil	93.0^{a}	0.5^{cd}	95.7^{e}	9.7^{d}
10.0[y]	Metro 500	110.3^{a}	4.3^{a}	540.6^{a}	89.8^{a}
	Metro 500:CYTC	103.5^{a}	2.7^{b}	418.7^{b}	55.7^{b}
	CYTC	100.3^{a}	0.5^{c}	188.3^{e}	21.0^{d}
	Metro 500:FYTC	114.9^{a}	2.3^{b}	398.9^{bc}	56.9^{b}
	FYTC	105.8^{a}	1.2^{bc}	306.5^{d}	42.5^{bc}
	Metro 500:Agrisoil	113.5^{a}	0.7^{c}	325.5^{cd}	39.2^{c}
	Agrisoil	100.2^{a}	0.5^{c}	145.4^{e}	16.0^{d}

[z]CYTC = Coarse yard trash compost, FYTC = Fine yard trash compost.
[y]Mean separation within columns of the same fertilizer rate by Waller-Duncan K-ratio t test (P = 0.05).

plants grown in Metro 500, 1.7 times as heavy as plants grown in coarse yard trash compost. Plants growing in other potting mixes containing compost in 0% shade showed similar declines in growth differentials as fertilizer levels increased. The fertilizer effect on plants in 30 and 50% shade was the same except for plants grown in Agrisoil under 50% shade. In other words, increased fertilizer levels had a greater effect on plants grown in potting mixes containing composted materials than plants grown in Metro 500.

Sutton (5) grew pickerelweed seedlings in sand culture at fertilizer rates of 0, 32, 64, 322 and 645 g Osmocote (unspecified ratio) per m^2 and reported the highest fertilizer rate produced plants with the greatest number of inflorescences and fresh/dry weight. Our results show that pickerelweed growth and flowering is fertilizer rate dependent in 0, 30 and 50% shade. Results also show that composted municipal solid waste and yard trash can be used as growth substrates for pickerelweed provided adequate levels of N, P, and K are available.

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