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UTILIZATION OF AGRISOIL™ COMPOST IN PRODUCTION OF FOLIAGE PLANTS

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Abstract. **Two factorial experiments in randomized block design were conducted with *Dieffenbachia* x 'Victory'™ and *Chamaedorea elegans* Mart. (parlor palm) utilizing Agrisoil™ in various potting medium combinations with Florida sedge peat moss, vermiculite and perlite, or pine bark and fertilizer levels of 3, 6 or 9 g Osmocote™ 19N-2.6P-10K (19N-6P_2O_5-12K_2O)/15-cm pot/3 months. Plant grade of palms decreased with increased percentage of Agrisoil™ in the media, while all other measurements for palm and dieffenbachia were affected by Agrisoil™ x fertilizer interactions. Electrical conductivity levels in media with pine bark were lower than those containing vermiculite and perlite for both dieffenbachia and palms; plant grade of dieffenbachia was slightly improved with inclusion of vermiculite-perlite rather than pine bark.**

Environmental concerns of the 1970's and 1980's indicated that methods of disposal/utilization of garbage would become more important over time. Use of processed garbage as a component of potting media for ornamental plants is not a new idea. Conover and Joiner (2) utilized garbage compost alone and with other medium amendments to grow potted chrysanthemums. When using garbage compost as a medium component, plant growth was excellent, production time was decreased and number of flowers was increased. The International Disposal Corporation of St. Petersburg, FL, went bankrupt due to its inability to sell the garbage compost utilized by Conover and Joiner in spite of the demonstrated usefulness of their product. In the interim, numerous other garbage, sewage or yard waste composts have been tried as potting media (3, 4, 5) and there is renewed interest in use of these products.

During the 1980's the state of Florida, like many other states, became aware of the fact that it was running out of landfill space. This, along with increasingly strict landfill requirements, has led public agencies to consider alternative projects such as incineration, yard refuse composting and garbage composting. Agrisoil™, a composted humus organic material from shredded garbage, is manufactured by Agripost™, Dade County, Florida, as a growing medium or medium component in an attempt to reduce the amount of municipal solid waste placed into landfills. To study the feasibility of use of this product for foliage plant production, two factorial experiments in randomized block design were conducted with *Dieffenbachia* 'Victory'™ and *Chamaedorea elegans* (parlor palm).

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Materials and Methods

Two 5x3x2 factorial experiments were initiated to test effects of Agrisoil™ (Agripost, Inc., Pompano Beach, FL 33061) and peat (Florida sedge peat moss) levels, fertilizer level and pine bark or vermiculite and perlite as medium amendments on growth of greenhouse-grown foliage plants. Because Agrisoil™ is primarily organic, combinations of peat and Agrisoil™ contributed 50% of the container volume at 0, 12.5, 25, 37.5 or 50% each with the remainder of the mix either 25% vermiculite and 25% perlite or 50% pine bark. All mixes were amended with .9 kg Micromax (Grace/Sierra, Milpitas, CA 95035)/m^3 and those medium combinations without Agrisoil™ were amended with 4 kg dolomite/m^3. Fertilizer levels of 3, 6 or 9 g Osmocote™ 19N-2.6P-10K (Grace/Sierra)/15-cm pot/3 months were tested with each of the various soil mix combinations. Experiments utilized five replications and were conducted in a glass greenhouse with maximum light levels of 570 $\mu mol \cdot s^{-1} \cdot m^{-2}$ and temperatures between 18° and 35°C. Both experiments were initiated 24 Apr. 1990. Electrical conductivity and pH of the leachate of the medium, collected by the pour-through method (7), and plant height data were collected initially and monthly until termination. Final plant grades (plant fullness and leaf color - using a scale of 1 = dead; 2 = poor quality, unsalable; 3 = fair quality, salable; 4 = good quality, salable; and 5 = excellent quality, salable) were taken for diffenbachia 31 July and for palms on 21 Sep.

Results and Discussion

Plant grade of palms was not affected by fertilizer level, but was slightly decreased by increase in Agrisoil™ percentage of the medium (Table 1). These data are consistent with a longer term crop grown in media with a fairly wide initial C:N ratio (30:1) and a crop with relatively low nutrient requirements (1, 6).

Agrisoil™ x fertilizer interactions occurred for all other measurements on parlor palms and dieffenbachia (Tables 2-8). The longer crop time for palm may have influenced final data compared to dieffenbachia because short-term effects are averaged over time. With parlor palm, Agrisoil™ x fertilizer interactions occurred on change in

Table 1. Effects of percentage of Agrisoil™ included in media on plant grade of *Chamaedorea elegans* (parlor palm).

% AGRISOIL™	PLANT GRADE[z]
0.0	4.1
12.5	4.2
25.0	4.0
37.5	3.8
50.0	3.8
Significance[y]	
Linear	*

[z]1 = dead; 2 = poor quality, unsalable; 3 = fair quality, salable; 4 = good quality, salable; 5 = excellent quality
[y]* = significant at the 5% level

Table 2. Interaction of Agrisoil™ x fertilizer on change in height (cm) of *Chamaedorea elegans* (parlor palm).

% AGRISOIL™	Osmocote 19-2.6-10/15-cm pot[z] 3 g	6 g	9 g
0.0	20.0	19.2	19.0
12.5	20.9	20.9	20.5
25.0	17.9	20.7	18.7
37.5	14.5	19.3	17.4
50.0	15.0	17.2	16.6
Significance			
Agrisoil™ *x* Fertilizer		P = 0.01 (**)	

[z]Applied 27 April and 24 July, 1990

height, pH and EC (Tables 2-4). Change in height generally decreased with increase in Agrisoil™ above 12.5%, but mainly at the lowest fertilizer level (Table 2). This reduction in incremental height change was also associated with relatively high pH (Table 3), but was most likely a growth reduction response early in the crop cycle when fertilizer availability was reduced by activity of microorganisms active in decomposition of Agrisoil™. Although pH generally increased with increase in Agrisoil™ (Table 3), the treatment with 12.5% Agrisoil™ was lower at the 3 or 6 g fertilizer rate. This change, although small, was associated with the greatest increase in incremental height and thus use of substrate nutrients. Electrical conductivity of the leachate at 50% Agrisoil™ was elevated at low fertilizer and depressed at higher fertilizer (Table 4). These data are consistent with media that are still undergoing decomposition, in that nutrients would still be locked up in microorganisms.

Table 3. Interaction of Agrisoil™ x fertilizer on pH of the leachate of the medium from *Chamaedorea elegans* (parlor palm).

% AGRISOIL™	Osmocote 19-2.6-10/15-cm pot[z] 3 g	6 g	9 g
0.0	7.3	7.3	6.2
12.5	7.0	7.2	6.8
25.0	7.6	7.4	6.6
37.5	7.8	7.5	7.0
50.0	7.9	7.7	7.2
Significance			
Agrisoil™ *x* Fertilizer		P = 0.01 (**)	

[z]Applied 27 April and 24 July, 1990

Table 4. Interaction of Agrisoil™ x fertilizer on electrical conductivity (μmhos/cm^2) of the leachate from *Chamaedorea elegans* (parlor palm).

% AGRISOIL™	Osmocote 19-2.6-10/15-cm pot[z] 3 g	6 g	9 g
0.0	220	851	1606
12.5	225	704	1595
25.0	373	1170	1983
37.5	306	1153	1840
50.0	458	865	1432
Significance			
Agrisoil™ *x* Fertilizer		P = 0.001 (***)	

[z]Applied 27 April and 24 July, 1990

Table 5. Interaction of Agrisoil™ x fertilizer on plant grade[z] on *Dieffenbachia* 'Victory'™.

% AGRISOIL™	Osmocote 19-2.6-10/15-cm pot[y] 3 g	6 g	9 g
0.0	3.9	4.3	5.0
12.5	3.9	4.9	4.3
25.0	2.9	4.7	4.9
37.5	3.9	3.8	4.9
50.0	3.2	4.8	4.0
Significance			
Agrisoil™ *x* Fertilizer		P = 0.001 (***)	

[z]1 = dead; 2 = poor quality, unsalable; 3 = fair quality, salable; 4 = good quality, salable; 5 = excellent quality
[y]Applied 27 April, 1990

Table 6. Interaction of Agrisoil™ x fertilizer on change in height (cm) of *Dieffenbachia* 'Victory'™.

% AGRISOIL™	Osmocote 19-2.6-10/15-cm pot[z] 3 g	6 g	9 g
0.0	27.6	25.8	31.4
12.5	23.6	30.4	27.4
25.0	15.5	28.5	30.1
37.5	27.6	23.6	31.0
50.0	20.9	30.5	25.0
Significance			
Agrisoil™ *x* Fertilizer		P = 0.001 (***)	

[z]Applied 27 April, 1990

With dieffenbachia, the Agrisoil™ x fertilizer interactions are similar for all measurements with poorest plant grade associated with shortest plants and highest pH and EC (Tables 5-8). Although, in general, increasing Agrisoil™ decreased plant grade and incremental height change, increasing fertilizer level was capable of preventing this trend. Poorest plants and least height gain at each fertilizer level were associated with each higher Agrisoil™ level beginning at 25% by volume (Tables 5 & 6), and it is possible that decomposition of Agrisoil™ reduced medium drainage as indicated by elevated pH and EC (Tables 7 & 8). Although Agrisoil™ has a relatively moderate C:N ratio,

Table 7. Interaction of Agrisoil™ x fertilizer on pH of the leachate of the media from *Dieffenbachia* 'Victory'™.

% AGRISOIL™	Osmocote 19-2.6-10/15-cm pot[z] 3 g	6 g	9 g
0.0	7.0	7.8	6.4
12.5	7.6	6.8	7.8
25.0	8.2	7.7	6.0
37.5	6.8	8.2	7.2
50.0	8.0	6.7	8.2
Significance			
Agrisoil™ *x* Fertilizer		P = 0.01 (**)	

[z]Applied 27 April, 1990

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

% AGRISOIL™	Osmocote 19-2.6-10/15-cm pot[z] 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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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