Table 2. Influence of propagation and growing media on top and root dry weights (g) of 3 foliage plants.

Propagation Medium	Growing Medium[z]	*Aglaonema* Top	*Aglaonema* Roots	*Dieffenbachia* Top	*Dieffenbachia* Roots	*Maranta* Top	*Maranta* Roots
Peat:Perlite	Vergro Klay Mix	5.8a[y]	4.2a	5.6a	2.3abc	3.9ab	1.1a
Peat:Perlite	Gro-Sorb	3.8bcde	3.3abcd	4.5abc	2.9abc	3.0abcd	1.0a
Peat:Perlite	Solite	4.9abc	3.4ab	4.0abc	3.4ab	4.2a	0.9a
Gro-Sorb	Vergro Klay Mix	4.1bcd	2.6abcde	5.6ab	2.3bc	3.5abc	1.0a
Gro-Sorb	Gro-Sorb	3.4 defg	2.8abcde	3.3abc	2.5abc	1.8cd	1.2a
Gro-Sorb	Solite	5.1ab	3.3abc	4.0abc	3.8a	2.3abcd	0.6a
Solite	Vergro Klay Mix	3.4defgh	1.9bcde	4.9abc	2.3abc	2.9abcd	0.6a
Solite	Gro-Sorb	3.5def	2.0bcde	2.7c	1.8c	2.2bcd	0.5a
Solite	Solite	2.0i	1.3e	4.3abc	2.2bc	1.5d	0.3a

[z]Plants in Gro-Sorb and solite were grown in hydroponic containers.
[y]Mean separation within columns by Duncan's new multiple range test, 5% level.

treatments, except peat:perlite/solite and Gro-Sorb/solite combinations (Table 2). The solite/solite combination produced the least top dry weight. Root dry weights were generally less affectel by growing media when propagated in peat:perlite or Gro-Sorb. *Aglaonema* generally produced vigorous, well branched root systems that recovered during the growing phase to any reduction in rooting due to propagation media, except when propagated in solite and grown in solite.

Maranta root development was not as extensive as *Aglaonema* or *Dieffenbachia* regardless of propagation media and did not improve in any growing media. Top dry weight varied depending on propagation/growing media combination (Table 2).

Dieffenbachia root dry weights were greater from the Gro-Sorb/solite combination than from the solite/Gro-Sorb or solite/solite ones. The other combinations produced root dry weights similar to Gro-Sorb/solite. Solite/Gro-Sorb plants had less top dry weight than plants propagated in either peat:perlite or Gro-Sorb and grown in Vergro Klay mix. However, propagating media did not affect plant top weights of *Dieffenbachia* regardless of the growing medium or growth system.

These results indicate, therefore, that the propagating medium has little effect on size and quality of the final product. Poor results obtained from solite suggest that root initiation and development is reduced in a highly aerated medium and that plant production time in hydroponic systems might be shortened and higher quality plants produced when propagated and grown in media containing more desirable air:water ratio.

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EFFECT OF GROWTH REGULATORS ON PIXIE POINSETTIAS GROWN WITH TWO IRRIGATION SYSTEMS[1]

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Abstract. **Multi-branched poinsettia 'Annette Hegg Diva' plants grown in 10 cm pots with hand or capillary mat irrigation were evaluated following treatment with granular ancymidol incorporated in the medium or ancymidol or chlormequat applied as a soil drench or foliar spray. Plants were generally taller on the capillary mat in 1977 but height differences due to irrigation method were not evident in 1978. In both years the granular ancymidol at concentrations ≥0.5 mg ai/pot produced plants excessively short (<15 cm). A concentration of this material as low as 0.0625 mg ai/pot produced well-proportioned plants (15-20 cm) and was equivalent to the effect of ancymidol applied as a soil drench. Foliar application of ancymidol did not retard plant height to a desirable level. Plants treated with chlormequat as a 2000 ppm foliar spray or a 3000 ppm soil drench were slightly tall (22 cm) in 1977 but of an acceptable height (18 cm) in 1978. Granular ancymidol ≥0.25 mg ai/pot and ancymidol drench ≥0.125 mg ai/pot reduced plant and inflorescence diameter.**

Potted poinsettias (*Euphorbia pulcherrima* Willd.) have increased in national sales to 22,550,000 pots in 1979, with a value of $57,139,000 (9). The majority of these sales are of plants in 15 cm diameter or larger containers for specialty purchases. Poinsettias also are adaptable to small pot culture, grown either as single stem or multi-branched plants, and have shown good consumer acceptance (3, 4, 7, 12). A growth retardant generally is used on poinsettias to obtain a well-proportioned plant, especially when grown in warm temperature areas. Two chemicals, chlormequat (1, 2, 8) and ancymidol (1, 8, 11), are useful as foliar sprays but are more effective as soil drenches in height retardation of poinsettias. Both application methods require an additional operation

[1]Florida Agricultural Experiment Stations Journal Series No. 2665. Trade names are included for the benefit of the reader and do not infer any endorsement or recommendation by the author.

in the crop cycle. A granular formulation of ancymidol amended to the soil medium retards poinsettia height and eliminates the additional application of growth regulators (11, 12). Watering of plants is usually either by hand, overhead sprinkling, or single-pot tube systems. Poinsettias also can be watered efficiently with a capillary mat (5, 6, 10). Plants grown with capillary irrigation are of high quality but are taller and flower development is reported to be delayed as compared to hand watered plants (10).

The purpose of this study was to evaluate the effectiveness of a granular formulation of ancymidol incorporated into the medium and chlormequat and ancymidol applied as either a foliar spray or soil drench for height retardation of multi-branched poinsettias grown in 10 cm pots and irrigated by hand or capillary mat systems.

Materials and Methods

Single unrooted terminal cuttings of poinsettia 'Annette Hegg Diva' were established in 10 cm diameter plastic pots (R-400) and placed under intermittent mist in a glasshouse with 50% shade. Each pot contained 400 ml of a medium composed of Florida Peace River peat, coarse white builders' sand, coarse vermiculite, and perlite (5:3:3:1, by volume). Medium was amended with 5.53 kg Osmocote® 18-6-12, 3.02 kg dolomite, 1.13 kg hydrated lime, 1.36 kg single superphosphate, and 1.13 kg Perk®[2] (a minor element mixture) per cubic meter. Initial pH of the medium was 6.3. A 0.01% granular formulation of ancymidol was prepared by spraying the concentrate on finely ground clay (Florex 30/60)[3] and was incorporated into the medium of selected treatments prior to sticking the cuttings. In 1977 the mist chamber was equipped with additional illumination of 100 lux from incandescent lights operating during 2200 to 0200 hours to prevent floral initiation. Plants were pruned manually to 4 nodes and grown to maturity on raised benches in a glass greenhouse with 40% shade, natural photoperiod, and a minimum night temperature of 15°C. Plants were spaced on 17.5 cm centers. Plants were watered either manually once a day (ca. 150 ml/pot) or with a Vattex® capillary mat. Water for the mats was distributed by 2 Viaflo® tubes running the length of the 1.2 m wide mat. Each pot was soil-drenched at pruning with 100 ml of a Truban®-Benlate® mixture (0.45 kg + 0.23 kg/100 liter, respectively) and hand-watered thoroughly to establish capillarity. Plants were sprayed weekly for disease and insect control.

Fall 1977. Cuttings were stuck on September 19 and removed from the mist chamber on October 10. They were pruned immediately and spaced on the benches. Watering of the capillary mat was controlled by a time clock which allowed water to flow through the Viaflo tubes during three 10-minute intervals daily. Growth regulator treatments were 1) control—water drench; 2) granular ancymidol incorporated in the medium at 0.25, 0.50, and 0.75 mg ai/pot; 3) ancymidol applied as an 80 ml soil drench at 0.25, 0.50, and 0.75 mg ai/pot; 4) ancymidol applied as a 15 ml foliar spray at 0.25, 0.50, and 0.75 mg/pot; 5) chloromequat (3000 ppm) applied as an 80 ml soil drench at 240 mg ai/pot; and 6) chlormequat (2000 ppm) applied as a 15 ml foliar spray at 60 mg ai/pot (two applications). Growth regulators were applied on October 28 with the additional foliar application of chlormequat on November 5. Each treatment had 5 single plant replications. Plant height, measured from the pot rim to the top of the uppermost inflorescence, was recorded on December 9.

Fall 1978. Cuttings were stuck in the medium on September 15. Established plants were removed from the mist chamber on October 9, pruned, and placed on the raised benches. Water flow through the Viaflo tubes was controlled by an experimental electrical moisture sensor[4] connected to the capillary mat. Growth regulator treatments were 1) control — water drench; 2) granular ancymidol incorporated at 0.0625, 0.125, 0.25, and 0.5 mg ai/pot; 3) ancymidol soil drench at 0.0625, 0.125, 0.25, and 0.5 mg ai/pot; and 4) chlormequat (3000 ppm) soil drench at 240 mg ai/pot; and 5) chlormequat (2000 ppm) foliar spray (times) at 60 mg ai/pot. Growth regulators were applied on October 28 with the additional foliar application of chlormequat on November 7. Each treatment had 10 single plant replications. Plant height, number of bracts with at least half the surface red, length of the two largest bracts per inflorescence, uppermost inflorescence diameter, and overall plant diameter were recorded on December 10.

Results and Discussion

Fall 1977. Plant response to the growth retardants was evident within 2 weeks of application date. Plants irrigated with the capillary mat were generally taller than those hand-watered (Table 1). The differences were more pronounced in the control plants and in treatments where the growth retardants were less effective. The foliar application of ancymidol retarded plant height at concentrations of 0.5 and 0.75 mg ai/pot as compared to the control plants but none of these treatments produced plants in the 15-20 cm range which is considered the most desirable height of pixie poinsettias (12). Both chlormequat treatments retarded plant height, were not significantly different from each other, and produced plants close to the desirable height. An earlier application of chlormequat might have been more effective in retarding plant height and producing a more proportional plant. Ancymidol applied as a soil

[4]Provided by Chapin Watermatics, Inc., Watertown, N.Y.

Table 1. Height of pixie poinsettias cv. Annette Hegg Diva grown with 2 irrigation systems and treated with growth regulators, Fall 1977.

Treatment	Concentration Solution ppm	Concentration mg ai/pot	Plant height (cm) Hand watered	Plant height (cm) Capillary mat
Control—water drench	—	—	31.1 a[z]	33.9 a
Ancymidol granulary	—	0.25	15.8 ef	15.7 d
	—	0.50	12.6 fg	14.1 de
	—	0.75	10.6 g	10.2 e
Ancymidol soil drench[x]	3.1	0.25	18.6 de	21.1 bc
	6.2	0.50	15.3 ef	17.6 cd
	9.4	0.75	16.2 ef	16.5 d
Ancymidol foliar spray[x]	16.7	0.25	27.7 ab	32.8 a
	33.3	0.50	25.2 bc	29.7 a
	50.0	0.75	26.6 b	30.8 a
Chlormequat soil drench[x]	3000	240	22.0 cd	21.6 bc
Chlormequat foliar spray[x]	2000	60	20.9 d	24.8 b
Mean			20.2	22.4

[z]Mean separation within columns by Duncan's multiple range test, 1% level.
[y]Granular ancymidol incorporated in soil medium prior to sticking cuttings.
[x]Drenches and sprays applied in 80 and 15 ml aliquots per plant, respectively, 3 weeks after pruning. Second chlormequat spray 4 weeks after pruning.

[2]A microelement mix manufactured by Kerr-McGee Corp., Jacksonville. FL.
[3]Prepared and provided by Elanco Products, Eli Lilly and Co., Indianapolis, IN.

Table 2. Effect of growth regulators on plant characteristics of pixie poinsettia cv. Annette Hegg Diva irrigated by hand, Fall 1978.

Treatment	Concentration mg ai/pot	Plant height (cm)	Plant diameter (cm)	Inflorescence diameter (cm)	Number colored bracts on Dec. 10
Control—waterdrench	—	22.2 a[z]	37.6 a	24.3 ab	11.6 ab
Ancymidol—granulary	0.062	17.7 bcd	34.6 abc	25.6 a	12.8 a
	0.125	17.1 bcde	32.0 bcd	24.4 ab	11.8 ab
	0.25	14.7 e	29.9 de	21.1 cdef	11.0 ab
	0.5	10.4 f	27.7 e	19.7 ef	9.8 b
Ancymidol—soil drenchx	0.062	19.3 b	34.8 abc	23.2 abcd	12.2 a
	0.125	16.7 cde	32.2 bcd	21.8 bcde	12.8 a
	0.25	16.1 de	31.3 cde	20.6 def	12.6 a
	0.5	14.9 e	31.6 bcd	18.9 f	11.8 ab
Chloromequat—soil drenchx	240	16.9 bcde	33.8 abc	22.8 bcd	11.8 ab
Chlormequat—foliar sprayw	60	19.1 bc	35.3 ab	23.5 abc	11.8 ab

zMean separation, within columns, by Duncan's multiple range test, 1% level.
yGranular ancymidol incorporated in soil medium prior to sticking cuttings.
xApplied in 80 ml aliquots per pot 3 weeks after pruning.
wApplied in 15 ml aliquots per pot 3 and 4 weeks after pruning.

Table 3. Effect of growth regulators on plant characteristics of pixie poinsettia cv. Annette Hegg Diva irrigated by capillary mat, Fall 1978.

Treatment	Concentration mg ai/pot	Plant height (cm)	Plant diameter (cm)	Inflorescence diameter (cm)	Number colored bracts on Dec. 10
Control—water drench	—	24.3 a[z]	36.1 abc	25.4 a	13.2 ab
Ancymidol—granulary	0.062	19.5 b	36.8 ab	22.8 abc	11.4 bc
	0.125	16.6 c	34.6 abc	22.9 abc	10.6 c
	0.25	13.7 d	30.0 de	22.2 bc	10.6 c
	0.5	10.0 e	26.2 e	18.8 d	10.8 bc
Ancymidol—soil drenchx	0.062	19.5 b	37.2 a	24.5 ab	12.0 abc
	0.125	17.4 bc	33.6 abcd	22.4 bc	13.2 ab
	0.25	15.7 cd	32.6 cd	21.7 c	14.0 a
	0.5	15.8 cd	33.3 bcd	20.6 cd	13.8 a
Chlormequat—soil drenchx	240	17.9 bc	35.0 abc	22.7 bc	12.0 abc
Chlormequat—foliar sprayw	60	19.5 b	36.4 abc	22.2 bc	12.0 abc

zMean separation, within columns, by Duncan's multiple range test, 1% level.
yGranular ancymidol incorporated in soil medium prior to sticking cuttings.
xApplied in 80 ml aliquots per pot 3 weeks after pruning.
wApplied in 15 ml aliquots per pot 3 and 4 weeks after pruning.

drench resulted in plants in the 15-20 cm height range except for the 0.25 mg ai/pot treatment. The granular ancymidol treatments caused height retardation evident prior to pruning. Only the 0.25 mg ai/pot rate produced plants taller than 15 cm, with the higher concentrations retarding growth excessively. Bract coloration appeared to be accelerated in the granular ancymidol treatments, especially in comparison with chlormequat.

Fall 1978. Plants produced during 1978 were generally shorter than in 1977 (Tables 2 & 3) due primarily to the lack of night illumination during root establishment in the mist chamber. Differences due to irrigation method were not evident and plant quality was not affected by irrigation system. All growth regulators produced plants significantly shorter than the control plants and, at certain concentrations, within the desirable 15-20 cm height range. Chlormequat applied as a soil drench or foliar spray produced plants 17.4 and 19.3 cm in height, respectively. Ancymidol used as a soil drench at 0.062 mg ai/pot produced plants similar in size to the chlormequat spray treatment. The remaining ancymidol drench treatments produced well-proportioned plants and were not different significantly. Granular ancymidol incorporated in the medium at 0.25 mg ai/pot or greater produced very short, dark green leaved plants not in proportion to the containers. Concentrations of 0.062 or 0.125 produced plants with similarly colored foliage but of an acceptable height.

Plant diameter of all treatments except granular ancymidol at 0.25 or 0.5 mg ai/pot was in proportion to plant height and container size. Inflorescence diameter was noticeably smaller at 0.5 mg ai/pot of ancymidol, irrespective of application method, and slightly smaller at 0.25 mg ai/pot. The remaining treatments did not reduce inflorescence diameter significantly. Number of red bracts on December 10 was not increased by ancymidol or chlormequat and bract length, which ranged from 8.4 to 10.2 cm, was not affected by the growth regulators.

Use of the granular formulation of ancymidol as an amendment to the medium prior to planting would eliminate one labor consuming step in the production of pixie poinsettias and provide similar height control as present growth retarding methods. The addition of Osmocote to the medium would eliminate the need for further fertilization of the plants during the crop cycle and providing water through the capillary mat would conserve a natural resource. Incorporation of these three factors would reduce some of the labor and expenses involved in the production of pixie poinsettia.

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NECTRIELLA (KUTILAKESA) PIRONII, A PATHOGEN OF ORNAMENTAL PLANTS[1]

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Abstract. **The fungus,** Nectriella (Kutilakesa) pironii, **causes stem and leaf galls, corky proliferations, and cankers of a wide host range of woody and herbaceous ornamental plants. Our plant disease records and data collected from artificial inoculations indicate that 42 genera belonging to 26 families in 16 orders are susceptible to this wound pathogen. Seven of the more popular foliage plants were tested for susceptibility to the pathogen and results indicated varying levels of resistance. Croton** (Codiaeum variegatum), **one of the more common and economically important hosts of this fungus, displayed a high degree of varietal susceptibility in inoculation tests.**

Nectriella pironii Alfieri & Samuels has been recently described (3), along with its imperfect state *Kutilakesa pironii* Alfieri (1), and has been reported as a wound pathogen on a number of woody and other ornamental plants (2). *N. pironii* causes stem and leaf galls, corky proliferations, and cankers on an extensive host range of woody and herbaceous ornamental plants. Our plant disease records in the Division of Plant Industry, Florida Department of Agriculture and Consumer Services, and data developed from experimental inoculations indicate that 42 genera belonging to 26 families in 16 orders are susceptible to this wound pathogen. The abundance of fungus inoculum on diseased plants, the ever-present mycophagous mites, and horticultural practices in ornamental plant production, are important factors of this disease phenomenon which could result in excessively high incidence of this disease, hence result in substantial losses due to poor, unthrifty, nonsaleable plants.

The purpose of this study was to determine the host range of some of the more popular foliage ornamental plants and the varietal susceptibility of four cultivars of croton (*Codiaeum variegatum* Blume), which has shown high susceptibility among some of its cultivars.

Materials and Methods

Seven foliage ornamental plants—*Aphelandra squarrosa* Nees cv. Dania, *Cordyline australis* Hook., *Dieffenbachia picta* Schott cv. Perfection, *Dracaena marginata* Lam., *Fatsia japonica* Decne. & Planch., *Ficus elastica* Roxb. cv. Decora Schrijveriana, *Philodendron* sp. cv. Red Emerald—were selected for inoculation and testing for susceptibility to *Kutilakesa pironii*. *Aphelandra squarrosa,* the zebra plant, was included as a standard in this trial because of its relatively high level of susceptibility to this pathogen as determined in previous studies (1, 2, 3). The cultivars of croton (*Codiaeum variegatum*) selected for comparative susceptibility were 'Bravo', 'Elaine', 'Norma', and 'Stoplight'. All of the test plants were large, vigorous, mature plants. All species were inoculated via two methods—a transverse cut through the stems of branch terminals with a sterile pruning tool and an oblique incision approximately 2-3 mm deep and 5-7 mm long made with a sterile scalpel at the stem nodes. Each test plant species or variety was inoculated with five transverse cuts and 25 incisions, with a like number serving as controls, except crotons which were given 30 incisions.

Two sources of inocula were used in this study, one from *A. squarrosa* designated Isolate A-7 and used as the pathogen for all foliage plants except croton and the other isolate derived from *C. variegatum* cv. Norma utilized in the varietal susceptibility of crotons. The two isolates were grown on PDA (broth of 200 g of boiled fresh Irish potatoes supplemented with 20 g dextrose, 1 g KH_2PO_4 and 18 g Difco agar, made up to 1 liter with deionized water) for 4 weeks at 25C under 12-hour periods of alternating light (fluorescent light, Westinghouse F20 T12/CW at an intensity of approximately 1400 lux) and dark.

Inoculation of the transverse cut stems consisted of placing one drop of approximately 0.05 ml of spore suspension containing 5.36×10^6 conidia per ml of deionized water, on the freshly cut surface of the stem. Stem incisions were inoculated by inserting a 2 mm diameter PDA plug bearing sporodochia of the fungus into the nodal incision. All inoculated plants plus the controls were placed on a greenhouse bench and observations made at 3-week intervals for 12 weeks, at which time final readings were made. Gall formation was measured as proliferated, callus tissue at the sites of inoculation, with subsequent re-isolation of the causal pathogen.

Results and Discussion

The degree of corky proliferation of gall tissue varied among the plants tested. *Aphelandra* produced galls up to 3 mm in diameter at cut surfaces and up to 5 mm at in-

[1]Contribution No. 494, Bureau of Plant Pathology.