Effect of Several Controlled-Release Fertilizers on the Growth of Four Foliage Plants[1]

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Abstract

Five types of controlled-release fertilizers were evaluated in individual experiments on *Dieffenbachia amoena* Bull., *Philodendron scandens* subsp. *oxycardium* Shott. Bunt. and *Ficus benjamina* L. Precise 12.0N-2.6P-5.0K (12-6-6) an encapsulated liquid fertilizer, applied at 656 kg (569 lb/A) N per ha per year, produced similar *Dieffenbachia* and *Philodendron* plant dry weights as 5 impregnated vermiculite and one ureaformaldehyde applied at higher rates of N. In a comparison with a water soluble 20.0N-8.7P-6.6K (20-20-20) fertilizer on *Brassaia actinophylla* Endl., dry weights and foliage color ratings of *Brassaia* plants fertilized with the water soluble fertilizer were greater than those of plants receiving the controlled release fertilizers. *Ficus* height, visual rating, dry weight and differences in green color values of leaves of plants fertilized with Precise 12.0N-2.6P-5.0K (12-6-6) were greater than those receiving other controlled-release fertilizer treatments. In a second experiment, *Ficus* plants fertilized with high rates of several controlled-release fertilizers and Scott Pro-Grow 25.0N-2.2P-8.2K (25-10-10) rates were equal or better in growth than plants receiving Precise and Osmocote 14.0N-6.1P-11.6K (14-14-14). Mag Amp 7.0N-17.4P-4.1K (7-40-6) plants treated with 900 kg/ha (784 lb/A) and 1200 kg/ha (1045 lb/A) performed poorly in all growth parameters measured. Plant growth from high rates of controlled-release fertilizers surface applied at the beginning of the experiment was equal to that produced with 20.0N-8.7P-16.6K (20-20-20) soluble fertilizer applied weekly at the rate of 1582 kg N/ha (1477 lb/A) per year.

Index words: *Dieffenbachia amoena, Philodendron scandens oxycardium, Ficus benjamina, Brassaia actinophylla,* nutrition, controlled-release fertilizers

Introduction

Controlled-release fertilizers are used in the foliage industry because of their capacities for extended nutrient release, high plant recovery rate of applied nutrients, reduced soluble salts, and lower labor costs. Conover, Poole and Henley (2) mentioned the potential benefits of controlled-release fertilizers used in the acclimatization of foliage. Plants and recommended rates of application have been provided for both production and maintenance of foliage plants (5). In a review of controlled-release fertilizers and their horticulture applications, Sharma (6) noted that most studies dealing with use of controlled-release fertilizers on foliage plants have considered only a single type of controlled-release fertilizer, Osmocote, in various formulations. He also reported that little was known about newer controlled-release fertilizers such as resin-coated liquids (Precise).

The objective of these investigations was to evaluate several impregnated vermiculite fertilizers, a ureaformaldehyde formulation (Pro-Grow), a resin-coated liquid fertilizer (Precise), in comparison to a liquid formulation, Mag-Amp or Osmocote.

Materials and Methods

Six experiments were conducted on 4 foliage plant species in a shaded greenhouse (22-44 klux or 2,000-4,000 ft-c) maintained at 21 °C (70 °F) minimum night temperature. Schefflera, *Brassaia actinophylla* Endl., seedlings, 10-15 cm (4-6 in), were grown from January 10 to June 28, one plant per pot. Data on plant height, foliage color, and dry weight were recorded on June 28 in Experiment 1. Experiments 2 and 3 were conducted with *Philodendron scandens* subsp. *oxycardium* (Shott) Bunt. using 2 rooted eye cuttings per pot and were grown April 8 to October 1 in Experiment 2. In Experiment 3, plants were grown from August 18 to January 17 with dry weight being recorded on January 17. Rooted terminal cuttings, 25-30 cm (10-12 in), of *Dieffenbachia amoena* Bull. were grown August 11 to January 10 in Experiment 4. *Dieffenbachia* dry weight was determined on January 10. Rooted cuttings of *Ficus benjamina* L. were potted on February 4 and April 7 in Experiments 5 and 6. Beginning at potting, the plants were fertilized with Peters[3] 20.0N-8.7P-16.6K (20-20-20) at the rate of 1582 kg N/ha (147 lb/A) per year [2.4 g/liter applied at rates of 240 ml (8 oz) per pot every two weeks] until the experimental fertilizers were applied on March 10 and August 20 in Experiments 5 and 6, respectively.

All experimental plants were transplanted into 15-cm (6 in) pots containing a medium 1:1:1 (v/v/v) sphagnum peat moss, builder's sand, and pinebark. Added amendments consisted of 3.6 kg (7.9 lb) dolomite, 0.8 kg (1.17 lb) Perk[4], and 75 ml (2.5 oz) Aquagro[5] wetting agent per m^3 (1.3 yd^3). The sand and the peatmoss were steam pasteurized before mixing, while pinebark was not.

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[3]Peter's Fertilizer Co., W.R. Grace and Co., Fogelsville, PA.

[4]Esteech General Chemical Corp., Winter Haven, FL.

[5]Aquatrols, Inc., Pennsauken, NJ.

Nine controlled-release fertilizers tested included: Precise[6] 12.0N-2.6P-5.0K (12-6-6) which is formulated using encapsulated liquid urea, ammonium superphosphate and muriate of potash; 5 expanded vermiculite fertilizers[7] 18.0N-3.9P-7.5K (18-9-9), 20.0N-02.2P-8.3K (20-5-10), 16.0N-1.7P-10.0K (16-4-12), 20.0N-2.2P-4.2K (20-5-5) and 15.0N-8.7P-4.2K (15-20-5) made by adding a hot slurry of ureaformaldehyde, monodiammonium phosphate and potassium sulfate to expanded vermiculite to produce 1-3 mm particles; Pro-Grow[7] 25.0N-4.4P-8.3K (25-10-10) made from urea, methylene ureas, monoammonium phosphate, and potassium sulfate to produce 3.5 mm granules; Mag-Amp,[8] 7.0N-17.4P- 4.1K (7-40-6), a combination of cogranulated magnesium ammonium phosphate and magnesium potassium phosphate; and Osmocote[9] 14.0N-6.1P-11.6K (14-14-14), a plastic resin-coated inorganic water soluble fertilizer.

Fertilizer treatments were broadcast on the medium surface every 4 months using one-third of the yearly rate. Precise was applied at the rate 656 kg N/ha (569 lb/A) per year as recommended by the manufacturer. Other fertilizers were applied at the yearly rates of 450, 675, and 900 kg N/ha (392, 588, and 784 lb/A). A check treatment of no fertilizer was included in all the *Dieffenbachia, Ficus,* and *Philodendron* experiments. In the *Brassaia* and *Ficus* experiments, soluble 20.0N-8.7P-16.6K (20-20-20) fertilizer was applied as a control at the rates of 1582 kg N/ha (1477 lb/A) per year. A randomized complete block design with 6 single plant replicates was used on all species, except the second *Philodendron* experiment which had 5 single plant replicates.

Results and Discussion

Vermiculite impregnated fertilizer particles were observed to float on water during initial irrigation and this may have affected their performance. The green color and contents of the Precise fertilizers disappeared from the individual capsules after a month. The resin capsules remained as a residue on the medium surface. *Brassaia* plants receiving liquid fertilization at yearly N rates approximately equal to the medium and high rate of the controlled release fertilizer combined, produced more dry weight, had better foliage color ratings, and were taller than plants receiving any of the controlled-release fertilizer treatments (Table 1).

Height of *Brassaia* plants fertilized with Scott 15.0N-8.7P-4.2K (15-20-5), low and medium rates, were statistically equal to the height of plants receiving Peter's 20.0N-8.7P-16.6K (20-20-20) soluble and this result cannot be explained.

The dry weights of *Brassaia* plants receiving various rates of controlled release fertilizers did not differ.

Precise, applied at a lower N per year rate than the medium rate of the other fertilizers, produced *Dieffenbachia* plants with statistically similar dry weight as the medium yearly rates of N from 18.0N-3.9P-7.5K (18-9-9) and 15.0N-8.7P-4.2K (15-20-5) and high yearly N rates of 20.0N-2.2P-8.3K (20-5-10), 20.0N-2.2P-4.2K (20-5-5), and 15.9N-8.7P-4.2K (15-20-5) (Table 2).

In the first experiment on *Philodendron,* plants fertilized with Precise had dry weights similar to plants receiving high and medium rates of all the other fertilizers except the medium rate of 15.0N-8.7P-4.2K (15-20-5) impregnated vermiculite (Table 2). However, in the second *Philodendron* experiment, Precise and all rates of the controlled release fertilizers had plants with similar dry weights (Table 2).

The highest rates of each of the test fertilizers produced the most desirable *Ficus* plants. In *Ficus* experiment 1, most controlled-release fertilizer treatments produced plants comparable in growth to plants receiving soluble fertilizer every 2 weeks.

The shortest plants in both experiments were produced by the check (no fertilizer) treatment (Tables 3 and 4). In *Ficus* experiment 1, the 16.0N-1.7P-10.0K (16-4-12) at 900 kg N/ha (784 lb/A) produced the tallest plants; however, plants receiving Precise and high rates of N (900 kg/ha) of all the fertilizers usually produced tall plants (Table 3). The Scott 15.0N-8.7P-4.2K (15-20-5) fertilizer at 900 kg N/ha (784 lb/A) produced the tallest plants in *Ficus* experiment 2 (Table 4). With the exception of plants receiving Mag-Amp 7.0N-17.4P-4.1K (7-40-6) at 900 and 1200 kg/ha, 16.0N-1.7P-10.0K (16-4-12) at 900 kg/ha, 20.0N-2.2P-4.2K (20-5-5) at 900 and 1200 kg/ha, 25.0N-4.4P-8.3K (25-10-10), and Precise 12.0N-2.6P-5.0K (12-6-6) at 900 kg/ha, all the fertilizers produced plants with similar heights. All fertilizer treatments except Precise 12.0N-2.6P-5.0K (12-6-6), at 900 kg/ha and Mag-Amp 7.0N-17.4P-4.1K (7-40-6) at 900 and 1200 kg/ha produced taller plants than unfertilized plants. These results disagree with the work of Conover and Poole (3) that showed N fertilization rate did not affect *Ficus* plant height.

Unfertilized plants produced the least dry weight in both experiments (Tables 3 and 4), however plants receiving Mag-Amp at 900 kg N/ha per year in *Ficus* experiment 1 did not differ from unfertilized plants in dry weight. Plants fertilized with Precise yielded the highest dry weights in the first *Ficus* experiment (Table 2). In *Ficus* experiment 2, some plants which received 900 kg N/ha per year had similar dry weight as plants receiving 1200 kg N/ha per year (Table 4). Dry weight of plants receiving Scott's 25.0N-4.4P-8.3K (25-10-10) at the rate of 1200 kg N/ha was greater than that of plants receiving Mag-Amp and Osmocote at 900 and 1200 kg N/ha, Precise at the rate of 900 kg N/ha per year, Scott 16.0N-1.7P-10.0K (16-4-12) at 1200 kg N/ha, 20.0N-2.2P-2.4K (20-5-5) at 900 kg N/ha, Precise 12.0N-2.4P-5.0K (12-6-6) at 900 kg/ha and no fertilizer. Joiner *et al.* (4) reported a decrease in dry weight with increases in N fertilization whereas an increase is noted in this study.

Plants receiving Precise had the highest visual rating in *Ficus* experiment 1 (Table 3), whereas plants receiving Scott 18.0N-3.9P-7.5K (18-9-9) at 1200 kg N/ha had the highest rating in *Ficus* experiment 2 (Table 4). There were no significant differences in the visual ratings of plants receiving high rates of Scott fertilizers in *Ficus* experiment 1. Plants receiving Mag-Amp or no fertilizer received similar ratings in *Ficus* experiment 2 (Table 4). Scott fertilizers at 1200 kg N/ha were usually rated simi-

[6] 3M Corp., Minneapolis, MN.
[7] O.M. Scott and Sons, Marysville, OH.
[8] W.R. Grace Co., Clarksville, MD.
[9] Sierra Chemical Co., Milpitas, CA.

Table 1. Effect of several controlled-release fertilizers on the dry weight, foliage color, rating, and height of *Brassaia actinophylla*. Experiment 1.

Fertilizer Source	Formulation	Yearly rate kg N/ha (lb N/A)	Plant height (cm)	Dry wt (g)	Foliage color[z] rating
Scott	15.0-8.7-4.2 (15-20-5)	450 (392)	49.2	43.6	2.0
	15.0-8.7-4.2 (15-20-5)	675 (588)	51.0	43.8	1.4
	15.0-8.7-4.2 (15-20-5)	900 (784)	45.6	37.4	2.8
Scott	16.0-1.7-10.0 (16-4-12)	450 (392)	45.2	38.6	1.0
	15.0-1.7-10.0 (16-4-12)	675 (588)	46.6	33.6	1.6
	16.0-1.7-10.0 (16-4-12)	900 (784)	47.8	37.6	2.2
Scott	18.0-3.9-7.5 (18-9-9)	450 (392)	41.0	31.8	1.8
	18.0-3.9-7.5 (18-9-9)	675 (588)	47.0	35.0	1.2
	18.0-3.9-7.5 (18-9-9)	900 (784)	47.2	37.0	3.0
Scott	20.0-2.2-4.2 (20-5-5)	450 (392)	46.4	38.0	1.6
	20.0-2.2-4.2 (20-5-5)	675 (588)	45.4	43.2	2.0
	20.0-2.2-4.2 (20-5-5)	900 (784)	45.0	37.0	2.2
Scott	20.0-2.2-8.3 (20-5-10)	450 (392)	42.6	33.0	1.6
	20.0-2.2-8.3 (20-5-10)	675 (588)	46.4	41.6	1.8
	20.0-2.2-8.3 (20-5-10)	900 (784)	42.2	35.2	2.8
Scott Pro-Grow	25.0-4.4-8.3 (25-10-10)	450 (392)	46.8	32.4	1.6
	25.0-4.4-8.3 (25-10-10)	675 (588)	46.4	34.2	2.6
	25.0-4.4-8.3 (25-10-10)	900 (784)	45.4	35.6	2.2
Precise	12.0-2.6-5.0 (12-6-6)	656 (569)	45.6	44.0	2.4
Liquid Peters	20.0-8.7-16.6 (20-20-20)	1582 (1477)	55.0	56.4	4.0
LSD 5% level			6.4	10.3	0.8

[z]Foliage color: 1 = light green, 2 = medium light green, 3 = medium dark green, and 4 = dark green.

Table 2. Effect of several controlled-release fertilizers on the dry weight of *Dieffenbachia amonea* and *Philodendron scandens* subsp. *oxycardium*. Experiments 2, 3, and 4.

Fertilizer Source	Formulation	Yearly rate kg N/ha (lb N/A)	Dry wt (g) Dieffenbachia	Dry wt (g) Philodendron	
			Expt. 2	*Expt. 3*	*Expt. 4*
Scott	15.0-8.7-4.2 (15-20-5)	450 (392)	13.2	10.0	4.4
	15.0-8.7-4.2 (15-20-5)	675 (588)	19.7	9.6	3.7
	15.0-8.7-4.2 (15-20-5)	900 (784)	18.7	12.8	5.6
Scott	16.0-1.7-10.0 (16-4-12)	450 (392)	13.2	8.8	4.3
	16.0-1.7-10.0 (16-4-12)	675 (588)	15.2	12.0	5.0
	16.0-1.7-10.0 (16-4-12)	900 (784)	16.8	12.4	4.7
Scott	18.0-3.9-7.5 (18-9-9)	450 (392)	10.8	9.5	4.0
	18.0-3.9-7.5 (18-9-9)	675 (588)	19.5	11.2	4.8
	18.0-3.9-7.5 (18-9-9)	900 (784)	17.4	11.8	4.2
Scott	20.0-2.2-4.2 (20-5-5)	450 (392)	14.6	8.8	4.4
	20.0-2.2-4.2 (50-5-5)	675 (588)	16.5	11.5	5.1
	20.0-2.2-4.2 (20-5-5)	900 (784)	18.8	11.4	5.3
Scott	20.0-2.2-8.3 (20-5-10)	450 (392)	11.6	10.3	4.2
	20.0-2.2-8.3 (20-5-10)	675 (588)	15.2	11.8	5.1
	20.0-2.2-8.3 (20-5-10)	900 (784)	19.7	12.3	5.1
Scott Pro-Grow	25.0-4.4-8.3 (25-10-10)	450 (392)	10.0	9.4	4.2
	25.0-4.4-8.3 (25-10-10)	675 (588)	16.4	11.2	3.6
	25.0-4.4-8.3 (25-10-10)	900 (784)	21.4	11.6	4.9
Precise	12.0-2.6-5.0 (12-6-6)	656 (569)	23.1	13.6	4.5
Check		———	7.8	7.2	1.8
LSD 5% level			4.2	4.2	3.1

lar in appearance to plants fertilized with Peter's soluble fertilizer.

Precise produced plants with the best leaf color in *Ficus* experiment 1 (Table 3), whereas high rates of the Scott fertilizers produced plants with the darkest green leaves in *Ficus* experiment 2 (Table 4). Unfertilized plants and those receiving low rates of N (450 kg/ha) of Scott fertilizer in *Ficus* experiment 1 and Mag-Amp in *Ficus* experiment 2 usually produced the poorest leaf color.

Table 3. Height, dry weight, visual ratings and Hunter color difference values of *Ficus benjamina* L. receiving various fertilizer treatments. Experiment 5.

Fertilizer Source	and Formulation	Yearly rate kg N/ha (lb N/A)	Plant height (cm)	Dry wt (g)	Visual rating[z]	Green color[y]
Scott	15.0-8.7-4.2 (15-20-5)	450 (392)	53.3	29.7	1.7	-18.2
	15.0-8.7-4.2 (15-20-5)	675 (588)	56.0	40.3	2.7	- 5.7
	15.0-8.7-4.2 (15-20-5)	900 (784)	56.5	45.7	3.0	- 6.3
Scott	16.0-1.7-10.0 (16-4-12)	450 (392)	45.0	29.8	1.7	-18.3
	16.0-1.7-10.0 (16-4-12)	675 (588)	55.3	38.6	2.5	-15.1
	16.0-1.7-10.0 (16-4-12)	900 (784)	71.2	46.4	2.8	-10.2
Scott	18.0-3.9-7.5 (18-9-9)	450 (392)	52.5	30.2	1.3	-17.4
	18.0-3.9-7.5 (18-9-9)	675 (588)	54.2	41.7	2.2	-13.5
	18.0-3.9-7.5 (18-9-9)	900 (784)	58.0	42.4	3.2	- 9.1
Scott	20.0-2.2-4.2 (20-5-5)	450 (392)	60.5	34.3	1.7	-16.2
	20.0-2.2-4.2 (20-5-5)	675 (588)	57.1	37.6	2.5	-15.1
	20.0-2.2-4.2 (20-5-5)	900 (784)	61.2	39.8	3.2	- 7.4
Scott	20.0-2.2-8.3 (20-5-10)	450 (392)	58.6	27.4	1.7	-17.4
	20.0-2.2-8.3 (20-5-10)	675 (588)	59.2	44.1	2.5	-14.0
	20.0-2.2-8.3 (20-5-10)	900 (784)	64.6	43.7	3.2	- 8.5
Scott Pro-Grow	25.0-4.4-8.3 (25-10-10)	450 (392)	54.0	33.8	1.7	-16.7
	25.0-4.4-8.3 (25-10-10)	675 (588)	62.4	41.1	2.5	-11.9
	25.0-4.4-8.3 (25-10-10)	900 (784)	61.4	42.2	3.0	- 4.6
Precise	12.0-2.6-4.0 (12-6-6)	656 (569)	60.0	53.3	4.0	19.8
Check, no treatment	———	———	37.0	12.1	1.0	-20.8
LSD 5% level			11.9	7.0	0.6	0.3

[z]A visual rating of 4 indicates a dark green color, full spreading habit, and nonspindly growth. A rating of 3 indicates medium to light green color and some spindliness. Rating 2 is indicative of light green color and a tall, spindly habit. Rating 1 indicates yellowish green to yellow color, short plants, thin growth and nonacceptable plants.

[y]Green color determined with a Hunter Color Difference Meter (1), using $\tan^{-1}$ a/b. The greater the value the more intense the green color.

Table 4. Height, dry weight, visual ratings and Hunter color differences values of *Ficus benjamina* L. receiving various fertilizer treatments. Experiment 6.

Fertilizer Source	and Formulation	Yearly rate kg N/ha (lb N/A)	Plant height (cm)	Dry wt (g)	Visual rating[z]	Green color[y]
Mag Amp	7.0-17.4-4.1 (7-40-6)	900 (784)	45.3	18.5	1.0	- 4.1
	7.0-17.4-4.1 (7-40-6)	1200 (1045)	49.5	22.0	1.3	- 5.7
Osmocote	14.0-6.1-11.6 (14-14-14)	900 (784)	55.7	24.7	2.3	0.0
	14.0-6.1-11.6 (14-14-14)	1200 (1045)	55.5	26.1	2.2	3.9
Scott	15.0-8.7-4.2 (15-20-5)	900 (784)	62.3	31.1	2.8	6.8
	15.0-8.7-4.2 (15-20-5)	1200 (1045)	55.1	31.6	3.0	12.4
Scott	16.0-1.7-10.0 (16-4-12)	900 (784)	54.4	30.7	2.7	6.2
	16.0-1.7-10.0 (16-4-12)	1200 (1045)	52.6	25.6	3.5	17.4
Scott	18.0-3.9-7.5 (18-9-9)	900 (784)	54.6	30.4	3.0	8.5
	18.0-3.9-7.5 (18-9-9)	1200 (1045)	57.8	32.0	4.0	9.6
Scott	20.0-2.2-4.2 (20-5-5)	900 (784)	49.1	25.4	3.0	6.2
	20.0-2.2-4.2 (20-5-5)	1200 (1045)	51.2	30.0	3.7	15.1
Scott	20.0-2.2-8.3 (20-5-10)	900 (784)	57.8	31.2	2.5	5.7
	20.0-2.2-8.3 (20-5-10)	1200 (1045)	57.9	31.4	2.5	7.9
Scott Pro-Grow	25.0-4.4-8.3 (25-10-10)	900 (784)	51.6	29.6	2.3	2.9
	25.0-4.4-8.3 (25-10-10)	1200 (1045)	55.0	32.9	2.8	11.9
Precise	12.0-2.6-5.0 (12-6-6)	900 (784)	49.5	24.2	2.3	9.6
	12.0-2.6-5.0 (12-6-6)	1200 (1045)	53.4	28.2	2.5	12.4
Peters Liquid	20.0-8.7-16.6 (20-20-20)	1582 (1477)	55.6	28.3	3.3	13.0
Check		0 (0)	42.3	13.8	1.0	- 6.2
LSD 5% level			9.1	6.1	0.6	8.1

[z]A visual rating of 4 indicates a dark green color, full spreading habit, and nonspindly growth. A rating of 3 indicates medium to light green color and some spindliness. Rating 2 is indicative of light green color and a tall, spindly habit. Rating 1 indicates yellowish green to yellow color, short plants, thin growth and nonacceptable plants.

[y]Green color determined with a Hunter Color Difference Meter (1), using $\tan^{-1}$ a/b. The greater the value the more intense the green color.

As the rate of application of the Scott formulations increased, *Ficus* plant height, dry weight, visual rating, and leaf color improved. Joiner *et al.* (4) have suggested much higher rates of N for production of *F. benjamina* stock plants (2800 kg N/ha) and potted aclimatized *F. benjamina* L. plants (2650 kg N/ha) than reported in the current investigation. Differences in application rates are probably due to environmental conditions, especially solar irradiance. Joiner *et al.* (5) grew stock plants at 86.1-107.6 klux (approx. 8000-10,000 ft-c) and acclimatized plants at 37.7-64.6 klux (approx. 3600-6200 ft-c), whereas the present investigation used 21-44 klux (2,000-4,000 ft-c).

Significance to the Nursery Industry

Results of the current investigation indicate that satisfactory growth can be obtained in *Dieffenbachia amoena* and *Philodendron scandens* subsp. *oxycardium* grown at 22-44 klux (2,000-4,000 ft-c) with a single broadcast application every 4 months of Precise 12.0N-2.6P-5.0K (12-6-6), Scott Pro-Grow 25.0N-4.4P-8.3K (25-10-10) and several Scott trionized fertilizers applied at the rate of 675 kg/ha (588 lb/A) per year. Three applications per year of these fertilizers or Osmocote 14.0N-6.1P-11.6K (14-14-14) applied at the rate of 1200 kg/ha (1045 lb/A) will yield comparable growth in *Ficus benjamina* as soluble fertilizer applied every 2 weeks at the rate of 1582 kg/ha (1477 lb/A) per year. Fertilizer rates higher than 675 kg/ha (588 lb/A) may be needed to obtain similar results at higher light intensities. *Brassaia actinophylla* plants grew better when fertilized with higher N rates (1582 kg/ha, 1477 lb/A) supplied by water soluble fertilizer, however higher rates of controlled-release fertilizer should be tried on *Brassaia*. Mag-Amp 7.0N-17.4P-4.1K (7-40-6) performed poorly in this investigation and cannot be recommended for foliage plant fertilization. Further studies should be conducted on liquid urea as an N source in foliage plant fertilization.

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Effects of Selected Pruning Methods on Subsequent Growth of *Photinia* x *fraseri*[1]

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Abstract

Single-leader, container-grown *Photinia* x *fraseri* Dress were selected for height uniformity and left unpruned (UN), pruned to 4 nodes with leaves (4NL), 8 nodes with leaves (8NL), or pruned to 8 nodes with all leaves removed (8N). Visible buds were present following pruning at all nodes. Unpruned (UN) plants produced only 1.9 breaks per plant; 4NL-4.0 breaks; and 8NL-7.1 breaks. The 8N plants developed short lateral breaks, but these died by the fourth week. All plants in the 8N treatment were dead at the termination of the experiment. The UN plants produced 39 cm (15.4 in) of new shoot growth; 4Nl-46 cm (18in), and 8NL-60 cm (23.6 in). Quality of 4NL and 8NL plants was excellent.

Index words: *Photinia,* pruning, shoot growth

Introduction

Photinia x fraseri is one of the more popular hedging and screening plants in the Southeastern United States (3,5,6). It is used on the West Coast of the U.S., in Europe, Australia and New Zealand. Desirable characteristics include rich ruby-red new leaves, lustrous green mature foliage, fast growth, and ease of container and field production. Disadvantages are blatant commonality (5), *Entomosporium maculatum* leaf spot (4), and reported difficulty in rooting cuttings (1).

Apical dominance is strong and results in a single leader with an occasional lateral shoot (6). Pruning is

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