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Paclobutrazol Optimizes Leaf Size, Vine Length and Plant Grade of Golden Pothos *(Epipremnum aureum)* on Totems[1]

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Abstract

Two experiments were conducted to determine a Bonzi (0.4% paclobutrazol) rate that would optimize leaf size, vine length and plant quality of golden pothos [*Epipremnum aureum* (Linden & André) Bunt.] on totem poles in 20 cm (3.4 liter) pots. In Experiment 1, six rooted pothos cuttings were transplanted around a totem and fertilized with 10 g of 19N–2.6P–10K (0.35 oz 19–6–12) Osmocote. After one week, each pot was treated with a 250 ml (8.5 fl oz) drench of water containing Bonzi at 0, 4, 8, 12, or 16 mg a.i. (paclobutrazol). Four mg of paclobutrazol per pot yielded the most desirable plants, based on average leaf size, vine length and plant grade. Experiment 2 was designed to refine the paclobutrazol application rate. Ten rooted cuttings of pothos were transplanted around a totem and fertilized at 10 g 19N–2.6P–10K (19–6–12) Osmocote. After one week, each pot was treated with a 100 ml drench of water containing paclobutrazol at 0, 1.3, 2.6, 4.0, 5.3, 6.6, or 7.9 mg. Paclobutrazol applied at a rate of 5.3 mg produced optimum leaf size and vine length and highest plant grades.

Index words: Bonzi, foliage plant, growth regulator.

Chemicals used in this study: Bonzi (paclobutrazol), (2RS,3RS)-1-(4-chlorophenyl)-2-(1,1-dimethylethyl)-(1*H*-1,2,4-triazol-1-yl)pentan-3-ol.

Species used in this study: golden pothos [*Epipremnum aureum* (Linden & André) Bunt.].

Significance to the Nursery Industry

Pothos plants grown by the nursery industry typically have small leaves. With the use of a growth regulator such as paclobutrazol, producers can grow pothos with larger leaves, which will increase marketing opportunities for pothos. Increasing demand for interiorscapes in large settings, such as hotels and malls, gives the opportunity for utilizing large-leafed plants that have not been preferred in smaller settings. Producers will find information in this paper useful for increasing leaf size to the extent of creating a new product and without undue hardship presented by increased production time.

Introduction

Interiorscaping requires the use of plants that hold up well in low light interiors. Variegated leaves on foliage plants can add diversity to a planting without the frequent plant replacement required with blooming plants (2). New or unusual features of commonly used plants could enhance interiorscape designs and create an increased market for these plants. Large commercial settings encourage the use of large plants or plants with large leaves (5).

Previous experiments using growth regulators with *Epipremnum aureum* had looked at various effects such as prevention of overgrowth (3) and promotion of growth of cuttings (7), but, at the time of planning these experiments, none had looked at increasing leaf size as a potential enhancement of pothos for interiorscape use. The following experiments were designed to investigate a preliminary finding that Bonzi (paclobutrazol) could increase leaf size of pothos. Large leaves would promote increased usage of this already popular foliage plant in interiorscapes.

Materials and Methods

Experiment 1. On July 1, 1992, six rooted pothos cuttings were transplanted around a square totem pole [91 cm tall × 5 cm on each side (36 in tall × 2 in on each side)] buried to the bottom of a 20 cm (3.4 liter) pot using Fafard #4 growing medium (Conrad Fafard, Inc., Agawam, MA), containing composted pine bark. Each pot was fertilized with 10 g of 19N–2.6P–10K (19–6–12) Osmocote (Grace-Sierra Co., Milpitas, CA), three to four month release time, on July 1 and again on October 13. On July 9, 1992, each pot was treated with a 250 ml drench of water containing Bonzi (Uniroyal Chemical Co., Middlebury, CT) at 0, 4, 8, 12, or 16 mg a.i. (paclobutrazol). All pots were placed in a shadehouse covered with 50% polypropylene shadecloth and watered with an overhead sprinkler system that operated two or three times per week, as needed, depending upon size of plants and time of year. Ambient temperatures [21 to 30C (70 to 86F), daytime; 10 to 27C (50 to 80F), nighttime] prevailed except that the shadehouse was covered with plastic in mid-October and heaters were set to come on if the temperature dropped to approximately 7C (45F). Each pot represented an experimental unit and there were five replications per treatment. Plants were graded on the basis of general leaf size throughout the pot on December 17, 1992 with 1 = smaller than typical pothos leaf size; 2 = typical leaf size; 3 = slightly larger than typical leaf size; 4 = much larger than typical leaf size and 5 = leaves about twice as large as typical leaf size. Length of the three longest vines

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Table 1. Effects of various paclobutrazol rates on leaf area, vine length and leaf size grade of pothos growing on a totem pole in a 20 cm pot from July 1, 1992, to January 8, 1993.

Paclobutrazol (mg/20 cm pot)	Leaf area[z] (cm^2)	Average vine length[y] (cm)	Leaf size grade[x]
0	648	123.7	1.8
4	1280	81.0	4.4
8	1013	57.2	3.8
12	1096	46.0	3.9
16	1162	48.3	3.5
Significance			
Linear	NS[w]	***	*
Quadratic	NS	*	***

[z]Combined area of five largest leaves.

[y]Average length of three longest vines.

[x]Leaf size grade based on size of leaves throughout the pot and on a scale of 1 = smaller than typical pothos leaf size; 2 = typical leaf size; 3 = slightly larger than typical leaf size; 4 = much larger than typical leaf size; and 5 = leaves about twice as large as typical leaf size.

[w]NS, *,**,***Nonsignificant, or significant at $P \leq 0.05$, 0.01 or 0.001, respectively.

Table 2. Effects of various paclobutrazol rates on leaf size, vine length and plant grade of *Epipremnum aureum* growing on a totem pole in a 20 cm pot from January 22 to June 10, 1993.

Paclobutrazol (mg/20 cm pot)	Leaf area[z] (cm^2)	Average vine length[y] (cm)	Plant grade[x]
0	720	107.5	3.0
1.3	831	74.5	3.9
2.6	1080	62.3	4.1
4.0	1080	46.1	4.3
5.3	1215	44.0	4.5
6.6	1087	34.7	4.2
7.9	1112	35.3	3.9
Significance			
Linear	****[w]	***	**
Quadratic	*	***	***

[z]Combined area of five largest leaves.

[y]Average length of three longest vines.

[x]Plant grade based on 1 = dead; 2 = poor quality, unsalable; 3 = fair quality, salable; 4 = good quality; and 5 = excellent quality.

[w]**,** or ***Significant at $P \leq 0.05$, 0.01 or 0.001, respectively.

in each pot was measured on January 5, 1993, and area of the five largest leaves per pot was taken on January 8.

Experiment 2. On January 22, 1993, ten rooted cuttings of pothos were transplanted around a totem pole in a 20 cm (3.4 liter) pot using Fafard #4 growing medium. Each pot was fertilized with 10 g of 19N–2.6P–10K (19–6–12) Osmocote, three to four month release time, on January 26 and refertilized on April 26. Each pot was treated with a 100 ml (3.4 fl oz) drench of water containing Bonzi (0.4% paclobutrazol) at 0, 1.3, 2.6, 4.0, 5.3, 6.6, or 7.9 mg a.i. on February 2, 1993. Plants were placed in a glasshouse painted to allow maximum light penetration at plant level of approximately 225 $\mu mol \cdot m^{-2} \cdot s^{-1}$ (1200 ft-c) with thermostats set for heaters to come on at 18C (65F) and pots were watered one to three times per week as needed. On March 23, pots were moved to a shadehouse covered with 73% polypropylene shadecloth, covered with plastic that was removed in mid-April, allowing a maximum light intensity of approximately 600 $\mu mol \cdot m^{-2} \cdot s^{-1}$ (3200 ft-c). Each pot represented an experimental unit and there were five replications per treatment. Plant grade, based on a scale of 1 = dead; 2 = poor quality, unsalable; 3 = fair quality, salable; 4 = good quality; and 5 = excellent quality, was recorded on June 7, 1993. Lengths of the three longest vines per pot were measured on June 8 and area of the five largest leaves per pot were taken on June 10.

Results and Discussion

Experiment 1. Plants treated with paclobutrazol at all application rates had increased total area of the five largest leaves per pot, decreased average vine length per pot and larger leaves throughout the pot than the pothos that did not receive a paclobutrazol treatment (Table 1). The lowest paclobutrazol application rate, 4 mg per pot, yielded a vine length that was shortened, but not extremely so, and large leaves consistently along the totem. Although total leaf area did not differ significantly due to treatment, plants treated with 4 mg paclobutrazol also had the largest total leaf size.

Experiment 2. Results confirmed earlier indications in Expt. 1 that treatment with any level of paclobutrazol increased total leaf area, decreased average vine length and improved plant grade when compared to plants not treated with paclobutrazol (Table 2). These results also agree with similar findings as a result of uniconazole and paclobutrazol drench treatments on golden pothos (8, 9). Paclobutrazol applied at 5.3 mg/20 cm pot maximized leaf size while not decreasing vine length excessively, as reflected in the highest plant grade. Although significant differences were observed among treatments, differences were not so pronounced that only the 5.3 mg rate could be recommended; rather data showed paclobutrazol somewhere between about 4 and 6 mg a.i. per 20 cm pot could enhance *Epipremnum aureum* quality on totem poles. No distortion of *Epipremnum aureum* leaves was observed although Tjosvold (6) saw leaf distortion of *Pothos aureus* (*Epipremnum pinnatum*) at 60 ppm. Differences in results could be due to any of several factors: plant species, drench vs. spray application, rate used, or presence or absence of pine bark in the medium, which binds Bonzi in the top part of the medium and can cut its activity in half (1, 4).

Since pots were salable in 6 months from the time that plants were placed around the totems, producers should find this information useful for producing and offering a higher quality product to interiorscapers and other consumers without undue hardship presented by increased production time due to paclobutrazol application.

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