

# Using Paclobutrazol to Suppress Inflorescence Height of Potted *Phalaenopsis* Orchids

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Linsey Newton and Erik Runkle



Department of Horticulture  
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# Using Paclobutrazol to Suppress Inflorescence Height of Potted *Phalaenopsis* Orchids

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## Objective

To determine the effectiveness of a paclobutrazol (Piccolo, Fine Americas) foliar spray on inhibiting the inflorescence height of potted *Phalaenopsis* orchids that have naturally tall inflorescences.

## Experimental Protocol

Three rates of Piccolo were applied as a foliar spray to *Phalaenopsis* at one of two times after exposure to a low temperature that induces flowering. Plants were compared with nonsprayed (control) plants. The effects of Piccolo were tested on three different *Phalaenopsis* clones. Ten plants of each clone were randomly assigned to each chemical treatment.

### Piccolo Treatments

1. none (control)
2. 15 ppm Piccolo
3. 30 ppm Piccolo
4. 45 ppm Piccolo

### Application Times

1. Before flower initiation (average inflorescence height between 1 and 2 cm)
2. After flower initiation (average inflorescence height between 10 and 18 cm)

### *Phalaenopsis* Clones

1. 'Andrew'
2. 'Miss Saigon'
3. 'Smart Thing'

Mature *Phalaenopsis* were grown at 29 °C (86 °F) until the start of the experiment and were then transferred to 23 °C (73 °F) on 20 December 2007 to induce flowering. Applications were made on 18 January 2008 and 4 February 2008. The chemical applications were applied as a spray using 2 quarts of solution per 100 square feet of bench space. A surfactant was not added to the spray solution. The rates used were based on a preliminary trial on *Phalaenopsis* 'Promis', which indicated that a solution containing 30 ppm of Piccolo provided a desirable response. Plants were grown under a maximum light intensity of 300  $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  (approx. 1,500 footcandles) and a 16-hour photoperiod. Plants were fertilized at each watering following standard plant production protocols established at Michigan State University.

When the plants were moved from constant 29 °C to constant 23 °C to induce flowering, the leaf number was counted and the leaf span was measured on each plant (Table 1). The date when a visible inflorescence (VI) appeared and the date the first flower opened was recorded for each plant. The length of each developing inflorescence was measured at the time of Piccolo application and weekly thereafter. When the first flower opened, the number of inflorescences

and the number of flower buds on each inflorescence were counted, and the height of the inflorescence to the first flower, total inflorescence height (height to the end of the inflorescence), and the length of the internode between the first and second flower were measured. The diameter of the first open flower on each plant was measured 2 weeks after the last plant of each clone flowered so that petals were fully expanded.

## Results

### *Inflorescence height*

The greatest effect of a Piccolo spray on height to first flower occurred in *Phalaenopsis* 'Andrew'; all three rates of Piccolo inhibited inflorescence elongation to the first flower by about 20% when applied before flower initiation (Figure 1, top graph; Figure 3). The height to first flower was shorter than the control plants on *Phalaenopsis* 'Miss Saigon' treated with 30 ppm Piccolo before flower initiation (Figures 1 and 4). Piccolo applications did not have a statistically significant effect on height to the first flower of *Phalaenopsis* 'Smart Thing' at the rates tested (Figures 1 and 5).

Piccolo only significantly inhibited total inflorescence elongation on one of the three *Phalaenopsis* clones studied (Figure 1, bottom graph). Compared with nontreated plants, inflorescence height of *Phalaenopsis* 'Andrew' at first open flower was shorter when treated with 15 ppm before flower initiation and 45 ppm applied either before or after flower initiation. The height of these inflorescences was 19% to 23% shorter than control plants. The other Piccolo treatments did not have a statistically significant effect on total inflorescence height of *Phalaenopsis* 'Andrew'.

The only other instance at first flowering in which Piccolo produced statistically shorter inflorescences was 2 weeks after the first application. On *Phalaenopsis* 'Andrew', all three rates of Piccolo applied before flower initiation inhibited inflorescence elongation at this time. Similarly, *Phalaenopsis* 'Miss Saigon' treated with 15 ppm Piccolo before flower initiation had 28% shorter inflorescences than the control when measured 2 weeks after application.

### *Node Length*

The effects of Piccolo applications on the length of the node between the first two flowers varied between clones (Figure 2). Both 30 and 45 ppm Piccolo applied after flower initiation on *Phalaenopsis* 'Andrew' caused this internode to be about 20% shorter than that of the control plants. On *Phalaenopsis* 'Miss Saigon', 15 and 45 ppm Piccolo applied after flower initiation reduced elongation of this same node by a similar amount. In *Phalaenopsis* 'Smart Thing', only 30 ppm Piccolo applied after flower initiation statistically elicited a shorter internode.

### *Other flowering characteristics*

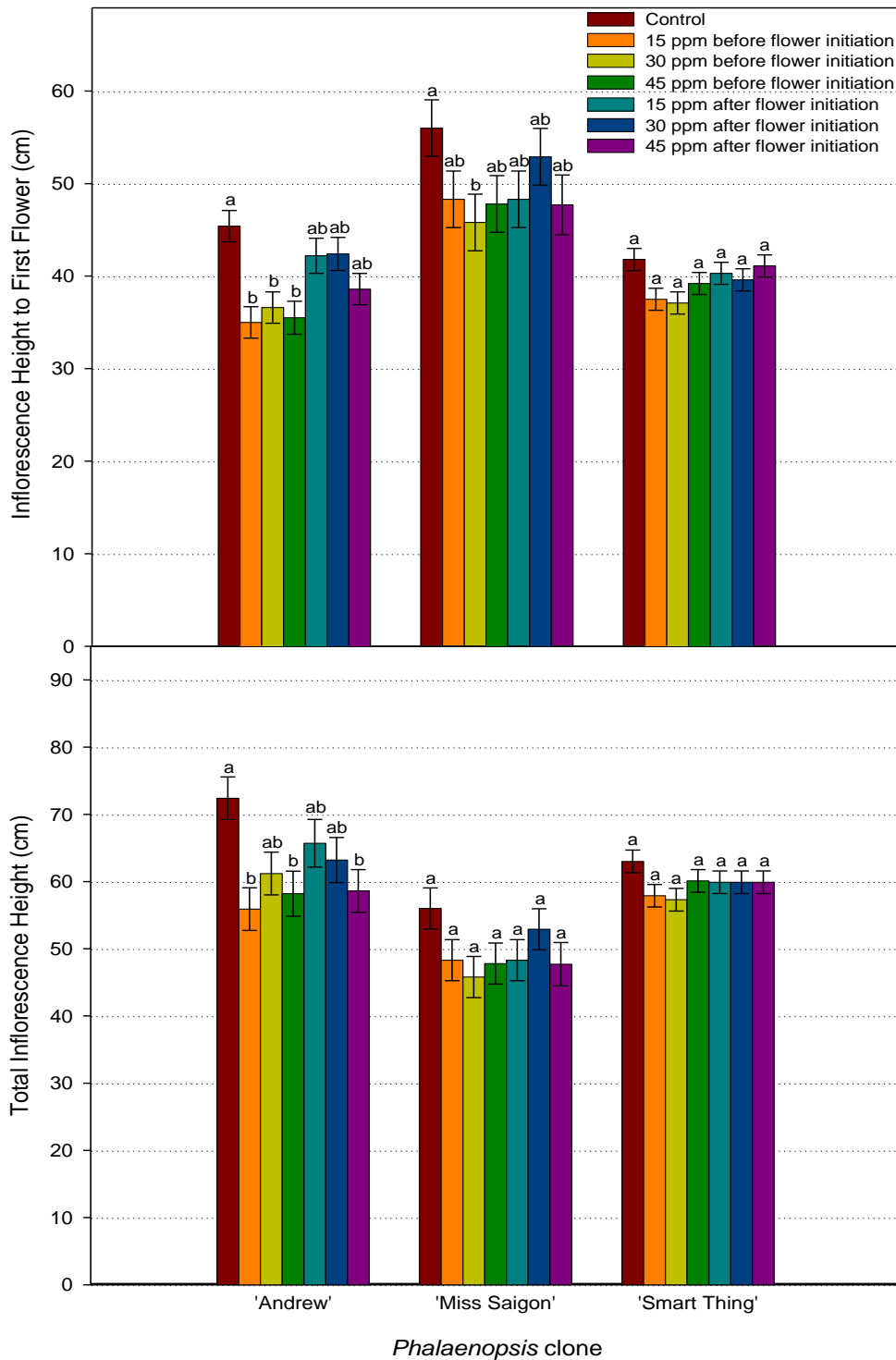
Applications of Piccolo did not influence the time between VI and the first open flower at the rates tested (Table 2). In addition, Piccolo did not affect the number of inflorescences or flowers formed or the diameter of the first open flower.

## Summary

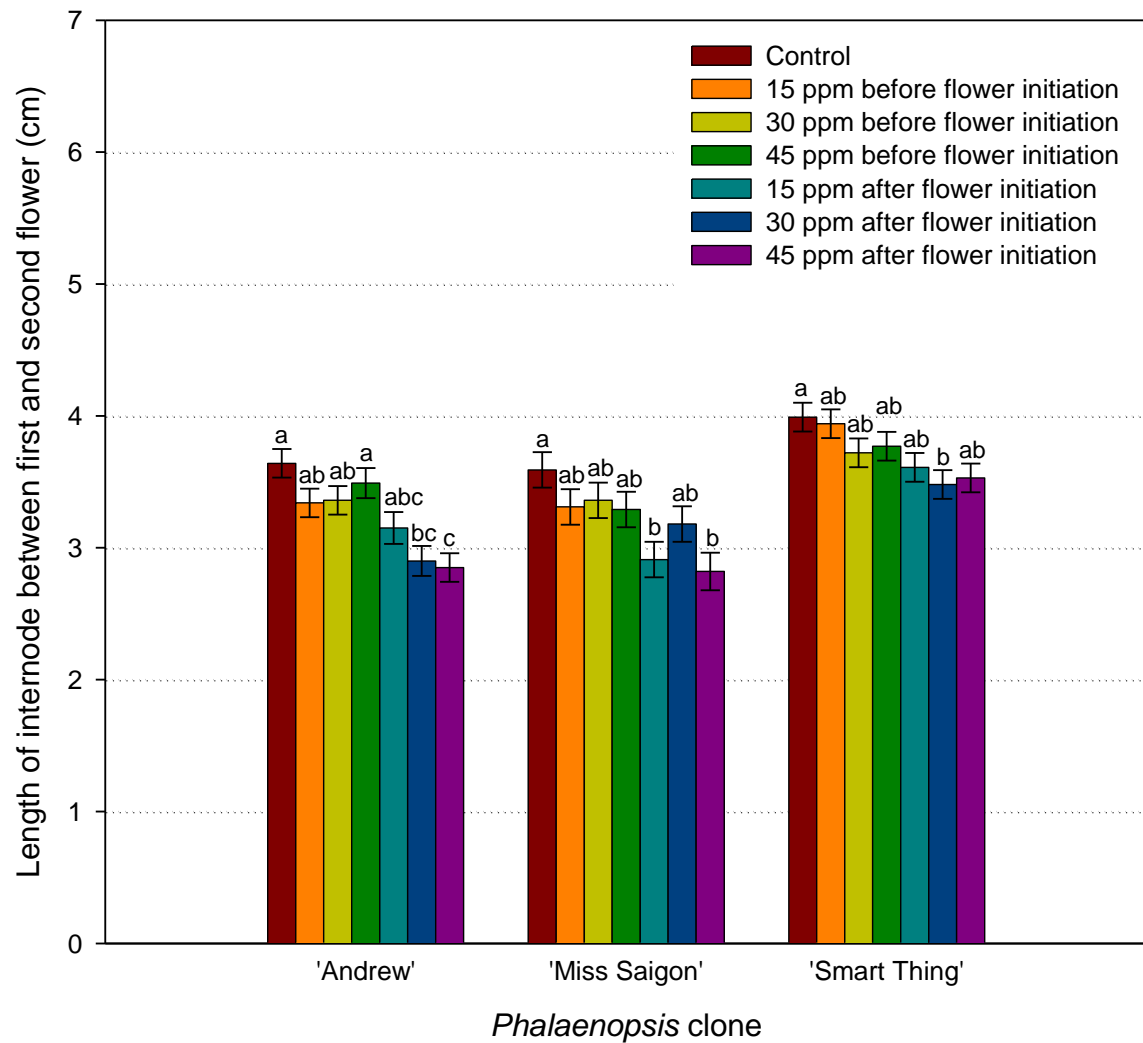
Spray applications of Piccolo were generally effective at inhibiting inflorescence height of one of the three *Phalaenopsis* clones at the rates tested. However, there was a tendency

towards inhibiting inflorescence elongation in all three hybrids. Applications of Piccolo before flower initiation (soon after inflorescence emergence) were generally more effective than an application made after flowers initiated (when inflorescences were 9 to 17 cm taller). In addition, the early applications did not cause shorter internodes between the first two flowers like some of the later applications did. Based on these results, we make the following suggestions for growers that want to inhibit inflorescence elongation of tall *Phalaenopsis* hybrids:

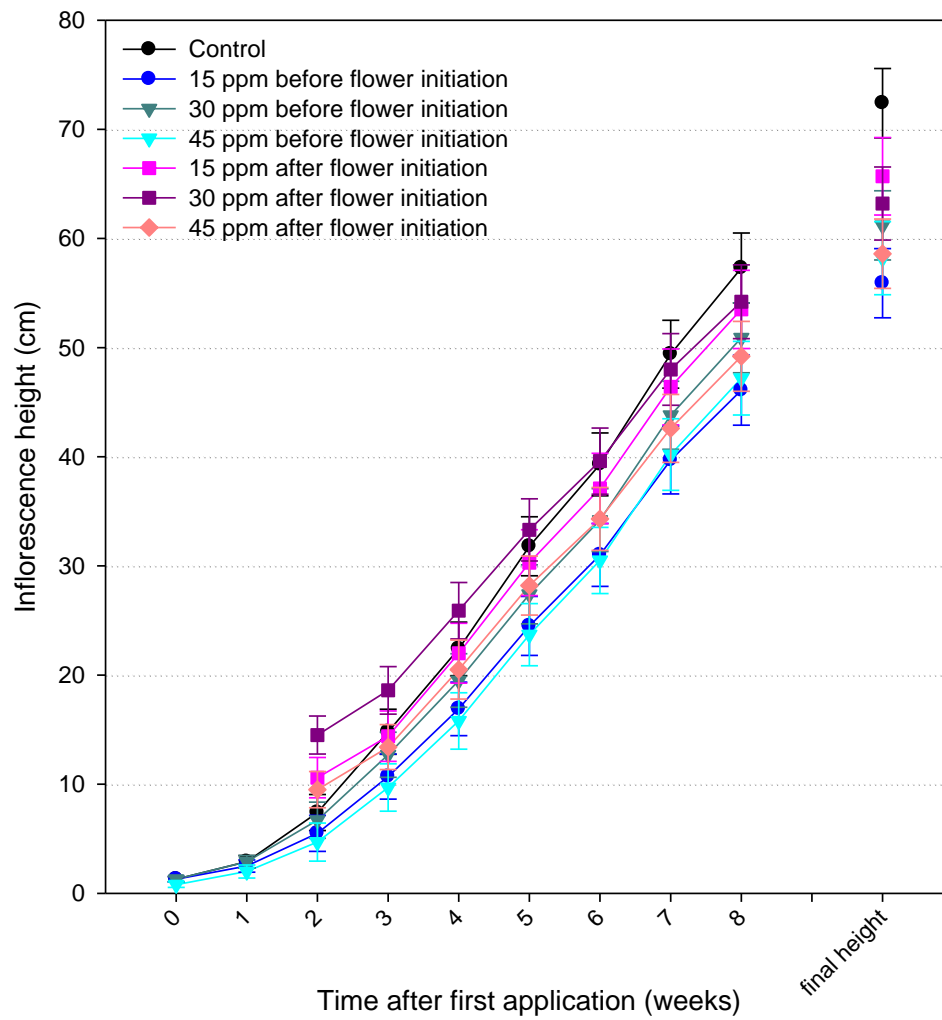
- Apply sprays soon after inflorescences emergence, when they are less than 3 cm tall
- Apply a spray of at least 30 ppm, depending on the cultivar
- Consider a second spray application if additional height control is desired
- Avoid late spray applications to prevent “bunching” of flowers
- Growers should conduct their own trials on a small scale to determine appropriate rates for their cultivars and desired response.



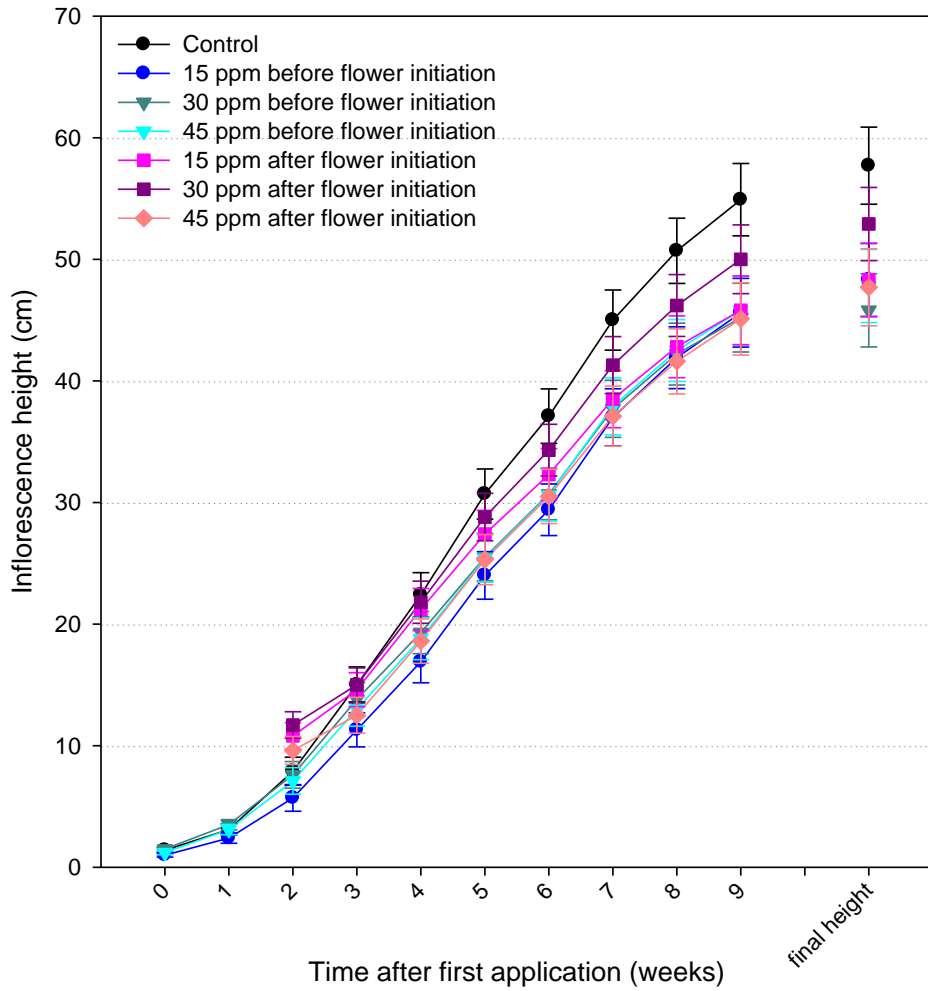
**Figure 1.** The effect of Piccolo sprays on average height to the first flower (top) and total inflorescence height (bottom) for the three *Phalaenopsis* clones studied. Means within a *Phalaenopsis* clone with the same letter are not significantly different by Tukey's honest significant difference at  $P \leq 0.05$ . Error bars represent the standard error for each mean.



**Figure 2.** The effect of Piccolo sprays on average internode length between the first and second flower for the three *Phalaenopsis* clones studied. Means within a *Phalaenopsis* clone with the same letter are not significantly different by Tukey's honest significant difference at  $P \leq 0.05$ . Error bars represent the standard error for each mean.

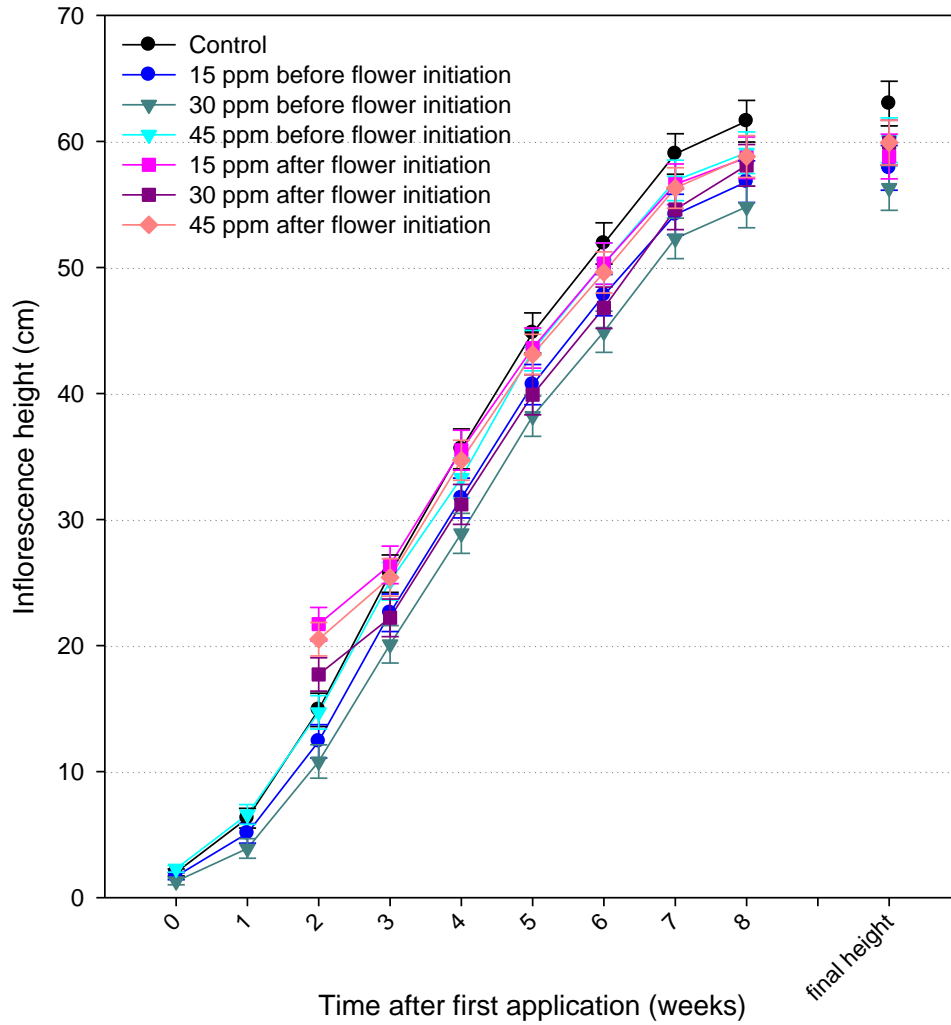


**Figure 3.** Weekly mean height of developing inflorescences on *Phalaenopsis* 'Andrew'. The first Piccolo application was made at week 0 and the second application was made at week 2. The final inflorescence height was measured when the first flower opened. Error bars represent the standard error for each mean.



**Figure 4.** Weekly mean height of developing inflorescences on *Phalaenopsis* ‘Miss Saigon’. The first Piccolo application was made at week 0 and the second application was made at week 2. The final inflorescence height was measured when the first flower opened. Error bars represent the standard error for each mean.





**Figure 5.** Weekly mean height of developing inflorescences on *Phalaenopsis* ‘Smart Thing’. The first Piccolo application was made at week 0 and the second application was made at week 2. The final inflorescence height was measured when the first flower opened. Error bars represent the standard error for each mean.

**Table 1.** The initial size (leaf span and number of leaves) of the three *Phalaenopsis* clones treated with Piccolo.

<i>Phalaenopsis</i> clone	Average leaf span (cm)	Average number of leaves
'Andrew'	53.2	5.0
'Miss Saigon'	42.7	5.8
'Smart Thing'	48.1	7.0

**Table 2.** The effect of Piccolo sprays on flowering characteristics of three *Phalaenopsis* orchid clones. Means within a column and *Phalaenopsis* clone with the same letter are not significantly different by Tukey's honest significant difference at  $P \leq 0.05$ . VI = visible inflorescence.

Application Time	Piccolo rate (ppm)	Days from VI to flower	Inflorescence number	Number of flower buds on first inflorescence	Number of flower buds per plant	First flower diameter (cm)
'Andrew'						
Control		85.2 a	1.0 a	10.1 a	10.1 a	10.1 a
Before flower initiation	15	82.8 a	1.0 a	8.5 a	8.5 a	9.7 a
	30	82.5 a	1.0 a	9.3 a	9.3 a	10.4 a
	45	84.0 a	1.0 a	9.0 a	9.0 a	10.0 a
After flower initiation	15	83.3 a	1.0 a	10.1 a	10.1 a	10.3 a
	30	84.8 a	1.1 a	8.9 a	8.6 a	10.2 a
	45	82.4 a	1.0 a	8.8 a	8.8 a	10.1 a
'Miss Saigon'						
Control		84.8 a	1.3 a	7.1 a	8.4 a	8.1 a
Before flower initiation	15	84.5 a	1.2 a	7.1 a	8.2 a	8.2 a
	30	84.2 a	1.1 a	6.7 a	7.3 a	8.1 a
	45	84.0 a	1.4 a	7.1 a	9.5 a	8.4 a
After flower initiation	15	84.4 a	1.2 a	6.7 a	7.8 a	7.7 a
	30	86.4 a	1.2 a	7.2 a	8.2 a	8.4 a
	45	88.0 a	1.2 a	6.3 a	7.3 a	8.1 a
'Smart Thing'						
Control		73.2 a	1.6 a	9.4 a	14.0 a	9.1 a
Before flower initiation	15	72.7 a	1.8 a	9.1 a	15.3 a	8.8 a
	30	73.5 a	1.6 a	9.6 a	14.3 a	8.5 a
	45	73.6 a	1.6 a	11.9 a	16.6 a	9.0 a
After flower initiation	15	73.5 a	1.8 a	8.9 a	14.5 a	9.0 a
	30	73.7 a	1.9 a	10.1 a	17.6 a	8.9 a
	45	74.0 a	1.6 a	10.5 a	15.0 a	8.9 a