INFLUENCE OF PROPAGATION, FERTILIZATION LEVELS, AND LIGHT ON GROWTH OF PSEUDERANTHEMUM SPECIES

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Abstract

Three new species of P s e u d e r a n t h e m u m which appear to have potential landscape value were selected from the Acanthus collection for further evaluation. One species, P. s i n u a t u m also shows potential as a new flowering potted plant. All 3 species root readily from terminal cuttings in 3-4 wks. and treatments with commercial preparations of IBA did not enhance rooting. High light (30% shade) resulted in significantly greater dry weight production and flowering on all 3 species compared to those grown under 80% shade. Increasing the rate of Osmocote 18N:2.6P:10K (2, 4, and 8 kg/cubic meter) produced a corresponding increase in flowering of all 3 species at the higher light level. This was also true for growth of 2 species (P. s p and P. s i n u a t u m) grown in high light, while P. l a x i f l o r u m produced best growth at the medium fertilizer rate. Fertilizer rate had no significant effect on growth at the 80% shade level for 2 species (P. l a x i f l o r u m and P. s i n u a t u m) while P. s p resulted in optimum growth at the medium fertilizer level. Relatively high levels of the major nutrients were found in the most recently matured leaves after 3 to 4 months, suggesting that P s e u d e r a n t h e m u m is a heavy feeder.

1. Introduction

The genus P s e u d e r a n t h e m u m belongs to the Acanthaceae family which contains many well known members that are commercially important ornamentals including: A p h e l a n d r a, C r o s s a n d r a, J u s t i c i a, F i t t o n i a, H e m i g r a p h i s, and T h u n b e r g i a. Reports on their propagation methods, cultural requirements, and pests are limited (Batson, 1973; Henny et al, 1983; Kerbo et al, 1976; McConnel et al, 1982; Roeber et al, 1980).

Three relatively unknown species of P s e u d e r a n t h e m u m (l a x i f l o r u m, s i n u a t u m, and an unidentified species) in the University of Hawaii Acanthus collection appear to have considerable potential as new landscape plants for warmer climates. Since little published information is available about the 70 species of P s e u d e r a n t h e m u m found in the tropics of both hemispheres (Bailey, 1976), these studies were initiated to develop some information on their cultural requirements prior to release to commercial nurseries.

2. Materials and Methods

The three P s e u d e r a n t h e m u m species chosen for this study were:

-P. l a x i f l o r u m is a shrub 2 to 4 ft high, with glabrous, oval or lanceolate-oblong leaves and axillary cymes with reddish purple flowers that contain an oblong, conical glabrous ovary. It is believed to have originated in the Fiji Islands (Bailey, 1976).

-P. s i n u a t u m is a sub-shrubby plant with linear, 3-inch long leaves that have the margins deeply scalloped and are pinkish-purple beneath. The flowers occur in terminal racemes, are large, white and spotted with purple. It is from New Caledonia (Chittenden, 1956).

-P. s p e c i e s is a shrub, 3 to 5 ft high, with glabrous, ovate leaves that are deep purple when mature and axillary cymes with white flowers spotted with purple, which are similar to but smaller than those P. s i n u at u m.

2.1. Experiment 1

Uniform 6-inch terminal and stem cuttings were used to evaluate the rooting of these species when treated with commercially available rooting powders (Hormex) with IBA at 0.3 and 0.8% compared to an untreated control. Three replications of ten cuttings per treatment were placed in vermiculite under intermittent mist under 30% shade with average day/night temperatures ranging from 27° to 15°C. Rooting percentage and rooting index were determined after 3 weeks.

2.2. Experiment 2

Uniform, well rooted cuttings were selected to determine the influence of Osmocote 18N:2.6P:10K (slow-release fertilizer from Sierra Chemical Co., Milpitas, CA 95035) rates (2, 4, and 8 kg/cubic meter) and light levels (30 and 80% shade) on growth and development of the 3 species. The cuttings were potted in 15-cm pots in a 1:1 peat:perlite mix amended with dolomitic lime, treble superphosphate and Micromax at 3.5, 0.4 and 0.6 kg/cubic meter, respectively, arranged in a split-plot design with 10 replications. Data were collected on plant height, growth index (H + W + W/3), flowering (1=No flowers, and 5=heavy flowering), and plant dry weight. Two composite samples were taken from recently matured leaves from each species for tissue analyses at the conclusion of the study.

3. Results

3.1. Experiment 1

All cuttings from the 3 species were well rooted after 3 weeks and were not influenced by treatment with rooting powders, the presence or absence of flowers, or the position on the mother plant.

3.2. Experiment 2

Dry weight increase for P. s i n u a t u m and P. s p e c i e s was correlated with an increase in the rate of fertilizer applied (Tables 1, 2). Largest plants were produced under the high light (30% shade) with the highest fertilizer rate. Optimum growth for P. l a x i f l o r u m was obtained with the high light (30% shade) and medium fertilizer rate as shown by dry weight and height increase (Table 3). All three species showed optimum growth with the medium fertilizer rate when grown under the low light (80% shade) level. Maximum flowering occured at the high fertilizer rate and high light level for all three species (Tables 1, 2, 3).

Relatively high levels of the major nutrients were found in the most recently mature leaves after 3 to 4 months, suggesting P s e u d e r a n t h e m u m is a heavy feeder (Table 4). Slightly higher nutrient levels were found in plants grown under lower light indicating that this light level (80% shade) may be limiting plant growth.

4. Discussion

A p h e l a n d r a s q u a r r o s a 'Dania', another easy to root member of the Acanthus family, has shown improvement in rooting with the use of rooting compounds (Henny et al, 1983). This was not true of the three P. species in this trial. All cuttings rooted equally well regardless of the treatment. The location of the cutting on the mother plant and its degree of flowering also had little effect on rooting.

All three species should be grown under high light to maximize growth and flowering. A p h e l a n d r a flowering occurs with high natural light in the summer (Batson, 1973), or with increased artificial light levels (Kerbo et al, 1976). Roeber et al (1980) also proposed the use of light intensities below 3000 lux to reduce flowering in stock plants and thus obtain a maximum number of cuttings for propagation.

High light should be used with 8 kg Osmocote 18-2.6-10/Cu M for P. s i n u a t u m and P. s p e c i e s for best production. Growth of P. l a x i f l o r u m was optimum at the 4 kg Osmocote level and increasing the fertilizer did not enhance growth further.

Further studies are underway to evaluate the influence of growth regulators and pinching to produce a more compact potted plant. These will be combined with keeping quality trial to evaluate their shipping potential and possible use as indoor plants.

References

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Table 1 - The influence of light and fertilizer (Osmocote 18-2.6-10) levels on growth and flowering of P. s i n u a t u m after 4 months.

Treatment				
Light level	Fertilizer rate (kg/cu m)	Height (cm)	Dry weight (g)	Flowering[y]
30% shade	2	30.9a[z]	11.43b	2.5c
	4	29.9a	14.16b	3.3b
	8	30.3a	18.61a	4.3a
80% shade	2	25.9a	5.88c	1.2e
	4	30.2a	7.74c	1.8d
	8	26.9a	7.91c	1.9d

[z]Mean separation within columns by LSD test, 5% level.
[y]Flower rating range was set as 1=no flowers, 5=very heavy flowering.

Table 2 - The influence of light and fertilizer (Osmocote 18-2.6-10) levels on growth and flowering on P. s p. after 3 months.

Treatment				
Light level	Fertilizer rate (kg/cu m)	Height (cm)	Dry weight (g)	Flowering[y]
30% shade	2	40.0ab[z]	10.83cd	1.9d
	4	44.2a	18.08b	3.2b
	8	35.6bc	23.63a	4.3a
80% shade	2	27.3d	7.35d	1.9d
	4	36.5b	13.27c	2.5cd
	8	28.5cd	13.42c	3.0bc

[z]Mean seaparation within columns by LSD test, 5% level.
[y]Flower rating range was set as 1=no flowers, 5=very heavy flowering.

Table 3 - The influence of light and fertilizer (Osmocote 18-2.6-10) levels on growth and flowering of P. l a x i f l o r u m after 3 months.

Treatment				
Light level	Fertilizer rate (kg/cu in)	Height (cm)	Dry weight (g)	Flowering[y]
30% shade	2	51.5b[z]	14.92bc	1.4d
	4	60.1a	26.79a	2.6bc
	8	28.6c	23.83a	4.4a
80% shade	2	46.2b	12.01c	1.3d
	4	44.5b	17.00b	2.4c
	8	28.1c	18.64b	3.1b

[z]Mean separation within columns by LSD test, 5% level.
[y]Flower rating range was set as 1=no flowers, 5=very heavy flowering.

Table 4 - Effect of species and light level on foliage nutrient content of P s e u d e r a n t h e m u m averaged across fertilizer rates.

		percent				
Species	Light Level	N	P	K	Ca	Mg
Laxiflorum	30%	3.04	.49	2.18	2.37	1.70
	80%	3.67	.46	2.72	2.65	1.68
Sinuatum	30%	3.48	.75	2.34	2.34	1.26
	80%	3.71	.76	2.50	2.44	1.27
Species	30%	3.62	.61	2.08	1.88	1.46
	80%	4.01	.55	2.94	2.16	1.40
Suggested Range		3.3-3.8	0.5-0.8	2.2-2.7	2.0-2.5	1.2-1.7