

PLANT GROWTH REGULATOR EFFECT ON LISIANTHUS GROWTH

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ABSTRACT: Fascination, a plant growth regulator composed of gibberellin 4+7 and benzyladenine, is currently labeled for use with Easter Lilies to decrease leaf yellowing and delay flower senescence. It has been observed that Fascination also caused unwanted stem elongation in lilies. In this trial, Fascination was applied to lisianthus, *Eustoma grandiflorum*, a cut flower common in the worldwide florist trade, transplants to evaluate its effect on stem length and diameter of the cut flowers. The stem length response of two harvest dates of the cultivar 'Echo Lavender' varied from a linear response in plants received as plugs in February to a quadratic response from plants received as plugs in March. There was no response in stem length from two harvests of 'Echo Blue' plants from 2 plug dates. The stem length response of 'Echo Lavender' over two harvests from plants received as plugs in March 2004 was a quadratic response; 'Echo Misty Blue' and 'Mariachi Pink' both exhibited a cubic response of stem length to the Fascination treatment. With the exception of 'Echo Blue', the lisianthus cultivars in this trial did respond with longer stem length due to Fascination treatment at transplanting compared to no application of Fascination. However, due to the variation observed in this trial of stem length response to the Fascination treatment, a single application rate of Fascination cannot be recommended.

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MATERIALS AND METHODS: The objective of this trial was to evaluate the effect of the plant growth regulator (PGR), Fascination, on stem length and diameter of lisianthus cut flowers. Field beds were prepared in a Quitman silt loam soil under an unheated cold frame covered with a single layer of greenhouse quality plastic. Three hundred lb/ac of 8-8-8 fertilizer was broadcast to the study area prior to bed formation. Beds were formed by a press-pan type bed shaper and were 6 in tall and 30 in across the top with bed centers spaced 5 ft apart. Irrigation was supplied by drip irrigation tape that delivers .22 gal/min/100 ft that was buried 1 in deep in the center of the bed. The beds were covered with black plastic mulch. Irrigation was supplied at one acre-inch per week. The beds were fertigated with 100 ppm N from Peter's 20-20-20 once per week, and irrigated as needed through the drip tape.

Fascination is a plant growth regulator (PGR) composed of 1.8% w/w N-(phenylmethyl)-1H-purine 6-amine and 1.8% w/w Gibberellins A4A7. There were 4 Fascination treatments: 0 ml, 10 ml, 25 ml, and 50 ml volumes of 25 ppm Fascination applied as a soil drench to the lisianthus transplants shortly after transplanting to the field beds.

The lisianthus plants were received as size 385 plugs from a commercial nursery on two dates: February 16 and March 15, 2004. The transplanted plugs were fertilized with 100 ppm ($\text{mg}\cdot\text{L}^{-1}$) N using Peter's Peat Lite Special 20-10-20 water soluble fertilizer. The seedlings were drenched with Banrot (etrizazole + thiophanate methyl) at a rate of 2 oz/gal prior to transplanting to the plant beds to reduce the chance of root rot problems. The plugs were transplanted into 606 cells filled with Metro 366 media and grown in a greenhouse until April 29, 2004 when plants from both plug dates were transplanted to field beds. These lisianthus cultivars included in the trial were 'Echo Blue', 'Echo Lavender', 'Echo Misty Blue', and 'Mariachi Pink'. The plants from both plug shipments were utilized for 'Echo Blue' and 'Echo Lavender', while only the plugs from the March plug shipment were used for the 'Echo Misty Blue' and 'Mariachi Pink' cultivars.

The first harvest of lisianthus flowers occurred for all cultivars from 6/9/04 – 7/15/04 while the second harvest of flower stems occurred from 8/5/04-9/7/04.

The experimental design was a randomized complete block with four replications of each treatment. The experimental unit consisted of two plants for each treatment that were planted in pairs. In the cold frame ground beds one plant of the pair was planted on each of two parallel rows that were spaced 12 in apart, and the plants in each row were spaced 12 in apart. The different cultivars were planted and evaluated individually.

The data recorded in this experiment were date of harvest, stem length, and stem diameter. The data were analyzed by SAS PROC GLM (SAS Institute Inc, Cary, NC). Mean separation was conducted with Fisher's Protected LSD at the 0.05 significance level. Orthogonal polynomial contrasts were used to evaluate possible trends in the effect of the PGR on lisianthus growth. The lisianthus cultivars were analyzed separately. Likewise, the growth responses of the lisianthus plants from each plug shipment date were analyzed separately.

RESULTS AND DISCUSSION: The growth response of lisianthus grown for fresh, cut flowers varied by cultivar. There was no growth response of 'Echo Blue' plugs received in February in the first harvest in June due to Fascination treatments (Table 1). There was a cubic response in stem length in the second harvest in August with the 10 and 50 ml treatments producing the longest stems. The 50 ml treatment produced the largest diameter stems of 'Echo Blue' in the second harvest. There were no differences in stem length or diameter due to Fascination treatments in the 'Echo Blue' plants from the March shipment of plugs (Table 2).

There was a linear response in stem length of 'Echo Lavender' received in February due to the Fascination treatments in the first harvest (Table 3). The longest stems resulted from the 0 ml and 10 ml treatments. The 0 ml treatment produced the longest stems in the second harvest, also. The stem diameter was not affected by the Fascination treatments in the first harvest. In the second harvest, the 0 and 25 ml treatments produced the largest stem diameters for 'Echo Lavender'. Both the stem length and stem diameter exhibited a quadratic response to the Fascination treatments in the plants received as plugs in March (Table 4). In this group of plants, the plants receiving the 50 ml treatment yielded the shortest stems.

The growth response of 'Echo Misty Blue' was similar for both harvest dates and was reported as the average of the two harvests (Table 5). The 10 ml treatment produced the longest stems.

The 'Mariachi Pink' plants yielded the longest stems from the 25 and 50 ml Fascination treatments (Table 6).

There was not a consistent result in stem length or stem diameter due to treatment of lisianthus plants in this trial with the PGR, Fascination. In the case of the second harvest of 'Echo Lavender' plants received in February, the control plants receiving 0 ml of the PGR produced longer stems than those plants receiving Fascination. In the 'Echo Lavender' plants received in March where the 50 ml treatment produced the shortest stems. On the other hand, with the 'Echo Misty Blue' plants, the control plants receiving 0 ml of Fascination were shorter than the plants receiving the PGR. The 25 and 50 ml treatments yielded the longest stems for the 'Mariachi Pink'. These inconsistent results would suggest that using Fascination to aid in stem elongation of lisianthus is not beneficial.

Table 1. Growth response from two harvest dates of ‘Echo Blue’ lisianthus plugs planted in February, 2004 to one application of the plant growth regulator, Fascination.

Fascination treatment ml	Stem length cm		Stem diameter cm	
	June	August	June	August
0	44.8 a ^z	27.1 b	0.43 a	0.38 b
10	45.0 a	28.9 a	0.47 a	0.38 b
25	47.5 a	27.2 b	0.45 a	0.37 b
50	49.1 a	29.3 a	0.45 a	0.40 a
		Cubic Response Pr > F 0.0062		Quadratic Response Pr > F 0.0001

^z Means with the same letter do not differ at the 5% significance level by Fisher’s Protected LSD.

Table 2. Growth response averaged over two harvest dates of ‘Echo Blue’ lisianthus plugs planted in March, 2004 to one application of the plant growth regulator, Fascination.

Fascination treatment ml	Stem length cm	Stem diameter cm
0	34.2 a ^z	0.41 a
10	36.1 a	0.42 a
25	34.3 a	0.45 a
50	33.4 a	0.41 a

^z Means with the same letter do not differ at the 5% significance level by Fisher’s Protected LSD.

Table 3. Growth response from two harvest dates of ‘Echo Lavender’ lisianthus plugs planted in February, 2004 to one application of the plant growth regulator, Fascination.

Fascination treatment ml	Stem length cm		Stem diameter cm	
	June	August	June	August
0	42.6 a ^z	23.4 a	0.43 a	0.35 a
10	41.5 a	20.6 c	0.43 a	0.32 b
25	35.9 b	21.4 bc	0.42 a	0.34 a
50	36.4 b	22.2 b	0.42 a	0.32 b
	Linear response Pr > F 0.0012	Quadratic Response Pr > F 0.0001	Cubic Response Pr > F 0.0003	

^z Means with the same letter do not differ at the 5% significance level by Fisher’s Protected LSD.

Table 4. Growth response averaged over two harvest dates of ‘Echo Lavender’ lisianthus plugs planted in March, 2004 to one application of the plant growth regulator, Fascination.

Fascination treatment ml	Stem length cm	Stem diameter cm
0	28.4 a ^z	0.37 b
10	28.9 a	0.38 ab
25	28.8 a	0.39 a
50	26.2 b	0.37 b
	Quadratic Response Pr > F 0.0076	Quadratic Response Pr > F 0.0031

^z Means with the same letter do not differ at the 5% significance level by Fisher’s Protected LSD.

Table 5. Growth response averaged over two harvest dates of ‘Echo Misty Blue’ lisianthus plugs planted in March, 2004 to one application of the plant growth regulator, Fascination.

Treatment ml	Stem length cm	Stem diameter cm
0 ml	27.8 c ^z	0.39 b
10 ml	33.0 a	0.42 a
25 ml	30.6 b	0.40 ab
50 ml	30.2 b	0.41 a
	Cubic Response	Linear Response
	Pr > F	Pr > F
	0.0001	0.0231

^z Means with the same letter do not differ at the 5% significance level by Fisher’s Protected LSD.

Table 6. Growth response averaged over two harvest dates of ‘Mariachi Pink’ lisianthus plugs planted in March, 2004 to one application of the plant growth regulator, Fascination.

Fascination treatment ml	Stem length cm	Stem diameter cm
0 ml	31.6 b ^z	0.40 a
10 ml	30.7 b	0.37 b
25 ml	34.1 a	0.40 a
50 ml	33.4 a	0.39 a
	Cubic Response	Cubic Response
	Pr > F	Pr > F
	0.0023	0.0001

^z Means with the same letter do not differ at the 5% significance level by Fisher’s Protected LSD.