Chemical Growth Retardant Application to Lisianthus

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Lisianthus [*Eustoma grandiflorum* (Shinn.)] is an annual with blooms that range from purple to white. Evaluators at the U.S. Dept. of Agriculture Florist and Nursery Crops Laboratory of Beltsville, Md., found lisianthus to be an ideal pot plant when grown as a pinched plant treated with chemical plant growth retardants (PGRs) (Roh and Lawson, 1984).

Several researchers have conducted studies with PGRs to control lisianthus height; foliar sprays of 2500 mg butanedioic acid mono(2,2-dimethylhydrazide) (daminozide)/liter, applied twice at a 7- and 14-day interval, and single 5000- or 7500-mg-liter⁻¹ sprays are effective in controlling plant height (Halevy and Kofranek, 1984; Hammer and Fultz, 1985; Starman, 1991a, 1991b; Tjia and Sheehan, 1986). Ancymidol applied as a 0.5-mg a.i./pot soil drench was effective in controlling height of a white cultivar (Halevy and Kofranek, 1984). [(E)-1-(4-chlorophenyl)-4,4-dimethyl-2-(1,2,4-triazol-yl)penten-3-ol] (uniconazole) sprays of 5 and 10 mg-liter⁻¹ and 0.2 mg a.i./pot as a drench also were effective (Starman, 1991a, 1991b). Varietal differences did exist in studies that tested more than one cultivar, but to our knowledge, limited information is available on the effectiveness of [(2RS, 3RS)-1-(4-chlorophenyl)-4,4-dimethyl-2-(1,2,4-triazol-yl)penten-3-ol] (paclobutrazol) or the response of the three lisianthus color cultivars to PGRs. This study was conducted to compare the effectiveness of paclobutrazol, daminozide, and uniconazole on plant height and days to flowering for blue, pink, and white lisianthus cultivars.

Seedling plugs of lisianthus cultivars Yodel Pink, Yodel Blue, and Yodel White were planted into 0.45-liter round pots on 14 Apr. 1993. The root medium contained 1 soil : 2 sphagnum peat : 2 perlite (by volume) amended with (all per cubic meter of mix) 890 g Ca(H₂PO₄)₂, 593 g KNO₃, 593 g MgSO₄·7H₂O, 4.75 kg ground limestone, and 74 g Peter's fritted trace elements no. 555 (Peters, Allentown, Pa.). Plants were fertilized at each watering with N at 201 mg-liter⁻¹; this was sup-

plied from KNO₃, Ca(NO₃)₂, and NH₄NO₃, at concentrations of 71, 65, and 65 mg-liter⁻¹, respectively. In addition, plants received K at 200 mg-liter⁻¹ from KNO₃ and P at 46 mg-liter⁻¹ supplied from 75% (w/w) technical grade H₃PO₄ in the irrigation system. Greenhouse night/day set points were 18/24°C. The plants were grown under natural daylengths. Plants were pinched, leaving four to six nodes on 14 May. On 2 June, five PGR treatments (mg-liter⁻¹) were applied as foliar sprays using a volume of 204 ml-m⁻²: daminozide at 2500 and 5000, paclobutrazol at 20, and uniconazole at 5 and 10, plus a nontreated control. A completely randomized design of six single-plant replicates was used. When the first inflorescence opened, plant height was measured from the pot rim to the top of the plant, and the number of days from transplanting until flowering was recorded. Data for all three cultivars were analyzed together using analysis of variance by general linear model procedures (SAS Institute, 1990). Significantly different means were separated by least significant differences (LSD) at *P* ≤ 0.05.

The results of the PGR applications were significant at the treatment × cultivar interaction. Foliar spray applications of 5000 mg daminozide and 5 or 10 mg uniconazole/liter had the greatest effect on plant height of 'Yodel Blue', with a reduction of 32%, 40%, and 36%, respectively, compared to the control (Table 1). For 'Yodel Pink' and 'Yodel White', 5000 mg daminozide/liter reduced plant height by 30% and 37%, respectively, compared to the control. Uniconazole at 5 and 10 mg-liter⁻¹ also reduced 'Yodel Pink' plant height by 27% and 28%, respectively, compared to the control. For 'Yodel White', 10 mg uniconazole/liter reduced plant height by 23%, compared to the control. At the concentration used, paclobutrazol had little effect on reduc-

ing plant height for any of the cultivars.

The effects of the PGR treatments on the number of days from transplanting to flowering were similar for all three cultivars. The use of 5000 mg daminozide and 5 or 10 mg uniconazole/liter significantly delayed flowering by at least 3 days [85.1, 82.9, and 83.2 days, respectively (LSD = 2.33)] when compared to the control (79.8 days).

The variations in cultivar response to the PGRs we observed are probably due to differences in vigor of the three cultivars. Significant differences in overall plant height existed among the cultivars. 'Yodel White' was the most vigorous cultivar, growing to 46.8 cm when untreated, while 'Yodel Pink' (39.9 cm) and 'Yodel Blue' (32.6 cm) were shorter. Rates of PGRs higher than those used in this study may be more effective in producing suitable pot-sized plants for the vigorous cultivars.

The degree of height control achieved with uniconazole agrees with earlier work done with 'Yodel Blue' by Starman (1991a, 1991b), although our study resulted in plants that were 52% and 34% shorter, respectively, for 5 and 10 mg uniconazole/liter than Starman's. The 5000-mg daminozide and 5- and 10-mg uniconazole/liter treatments were the most effective in controlling plant height and produced the most marketable-sized plants, with only a minimal delay in flowering. Paclobutrazol at 20 mg-liter⁻¹ had little effect on lisianthus plant height. Further research will need to be conducted to determine optimal rates for paclobutrazol as an effective PGR on lisianthus.

Literature Cited

- Halevy, A.H. and A.M. Kofranek. 1984. Evaluation of lisianthus as a new flower crop. *HortScience* 19:845-847.
- Hammer, P.A. and C. Fultz. 1985. The effect of B-Nine SP on height of lisianthus. *Focus on Floriculture* 13(4):1-3.
- Roh, M.S.M. and R.H. Lawson. 1984. The lure of lisianthus. *Greenhouse Manager* 2(11):103-106, 112-121.
- SAS Institute. 1990. SAS/STAT user's guide, vol. 2, version 6, 4th ed. SAS Inst., Cary, N.C.
- Starman, T.W. 1991a. Lisianthus growth and flowering responses to uniconazole. *HortScience* 26:150-152.
- Starman, T.W. 1991b. Corrigendum. *HortScience* 26:333.
- Tjia, B. and T.J. Sheehan. 1986. Chemical height control of *Lisianthus russellianus*. *HortScience* 21:147-148.

Table 1. Plant growth retardant (PGR) effect on height of lisianthus cultivars Yodel Blue, Yodel Pink, and Yodel White.

PGR	Concn (mg-liter ⁻¹)	Cultivar		
		Yodel Blue ht (cm)	Yodel Pink ht (cm)	Yodel White ht (cm)
None	---	32.6	39.9	46.8
Daminozide	2500	31.9	34.1	38.1
	5000	22.2	27.8	29.6
Paclobutrazol	20	29.8	40.1	42.1
Uniconazole	5	19.7	29.2	45.1
	10	20.9	28.7	35.8
Significance			**	
LSD ($\alpha = 0.05$)			6.24	

**Significant at *P* ≤ 0.01 for the treatment × cultivar interaction.

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