

HEIGHT CONTROL OF EXACUM AND CHRYSANTHEMUM WITH PACLOBUTRAZOL, XE-1019, FLURPRIMIDOL AND RSW-0411

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Abstract. *Exacum affine* Balf.f. 'Blue Champion' plants were grown in 12.5-cm pots in the summer of 1986 and treated with growth retardants 2 weeks after transplanting. Plants similar to daminozide (B-Nine) at 2500 ppm applied twice were those treated with paclobutrazol (Bonzi, PP333) at 50 ppm, XE-1019 (Sumagic) at 3.125 and 6.25, flurprimidol (EL-500) at 25 ppm and RSW-0411 at 25 and 100 ppm.

Chrysanthemum morifolium Ramat. 'Pert' and 'Bright Golden Anne' were planted five per 15-cm pot on 5 March 1986 and treated on 24 March. For 'Bright Golden Anne', treatments resulting in plants similar to two daminozide sprays at 5000 ppm were paclobutrazol at 400 ppm once or 100-200 ppm twice as a spray or at 0.5 mg/pot as a drench and XE-1019 as a 0.1-mg/pot drench. Sprays of XE-1019 at 25 ppm produced plants 5 cm taller than the daminozide treatment. For 'Pert', treatments resulting in plants similar to daminozide at 2500 ppm applied once were sprays of paclobutrazol at 200-400 ppm once or 50 ppm twice or a drench at 0.25 mg/pot and XE-1019 spray at 6.25-25 ppm or drench at 0.025 mg/pot.

Paclobutrazol (1, 3-8), XE-1019 (4, 5, 9), flurprimidol (1, 2, 4, 7), and RSW-0411 are relatively new growth retardants with activity on many ornamental species. This study evaluates paclobutrazol and XE-1019 on chrysanthemums and each of the chemicals on exacum.

Materials and Methods

Exacum. Plants of *Exacum affine* 'Blue Champion' were obtained from commercial sources as seedlings and transplanted into 12.5-cm pots using Metro Mix 300. Plants were fertilized at each watering with a 20N:4.4P:16.6K at 300 ppm N.

Chemicals were applied 2 weeks after planting as a spray at 215 ml/m² (2 qt/100 ft²). Plant height from pot rim was measured after 8 weeks. Treatments were paclobutrazol at 12.5, 25, 50, or 100 ppm; XE-1019 at 3.125, 6.25, 12.5, or 25; flurprimidol at 25, 50, 100, or 200 ppm; RSW-0411 at 12.5, 25, 50, or 100 ppm; Daminozide (B-Nine) at 2500 ppm applied twice or three times at 7 day intervals; or nontreated control. The experiment was in a randomized complete block design with four replications of two plants each.

Chrysanthemum. Rooted cuttings of *Chrysanthemum morifolium* 'Pert' and 'Bright Golden Anne' were planted

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five per 15-cm pot on 5 Mar. 1986. Medium was Vergro Klay Mix (Verlite Co., Tampa Fla.) and fertilization was as described for exacum. Plants were pinched after 1 week. Short Days were started after 1 and 3 weeks for 'Bright Golden Anne' and 'Pert', respectively.

Growth retardant treatments were applied after 19 days. Paclobutrazol was applied as a spray at 100, 200, and 400 ppm once or twice or as a drench at 0.125, 0.25, or 0.5 mg/pot. XE-1019 was applied as a one time spray at 6.25, 12.5, or 25 ppm or a drench at 0.25, 0.05, or 0.1 mg/pot. Daminozide was applied as a spray at 2500 ppm once to 'Pert' and at 5000 ppm twice to 'Bright Golden Anne'. Also, nontreated control plants were included. Experimental design was a randomized complete block with four replications of two plants each. Plant height from pot rim was determined on 13 May.

Results and Discussion

Exacum. Paclobutrazol and RSW-0411 caused only moderate reductions in plant height and increasing concentrations did not give a large increase in response (Table 1). XE-1019 and flurprimidol had a greater effect on height than paclobutrazol and RSW-0411 and there was a distinct rate effect. Optimum height was 19 to 20 cm which was provided by XE-1019 at 3.125 and 6.25 ppm. Plants treated with EL-500 at 25 ppm were 18 cm.

Research on several bedding plant species by Barrett and Nell (5) also found cases where paclobutrazol at normal commercial concentrations showed little effect from increasing concentrations while XE-1019 caused the normal shorter plants with increasing concentrations. RSW-0411, paclobutrazol and XE-1019 are chemical analogs. There has been few research reports on RSW-0411, but these results on exacum indicate its efficacy is more similar to paclobutrazol than to XE-1019.

Table 1. Plant height of growth retardant treated exacum.

Chemical	Concentration (ppm)	Plant Ht (cm)
Paclobutrazol	12.5	22
	25	21
	50	20
	100	21
XE-1019	3.125	19
	6.25	20
	12.5	17
Flurprimidol	25	16
	50	18
	100	16
	200	14
RSW-0411	12.5	21
	25	19
	50	21
	100	19
Daminozide	2500 (2x) ²	19
	2500 (3x)	17
Nontreated		23
HSD	5%	3.6

²Daminozide was applied either 2 or 3 times at 7 day intervals.

Table 2. Heights of 'Pert' and 'Bright Golden Anne' chrysanthemums treated with paclobutrazol and XE-1019.

Treatment	Concentration (spray: ppm) (drench: mg/pot)	Plant ht (cm)	
		Bright Golden Anne	Pert
Paclobutrazol spray once	100	43.2	33.1
	200	39.4	33.3
	400	37.1	30.1
spray twice	50	43.4	30.6
	100	36.1	28.8
	200	36.3	25.6
drench	0.125	44.6	33.4
	0.25	42.4	30.7
	0.5	37.0	27.6
XE-1019 spray	6.25	48.6	33.4
	12.5	42.6	31.8
	25	40.1	32.0
drench	0.025	42.6	31.2
	0.05	38.1	29.3
	0.1	33.1	27.4
Daminozide	z	35.6	31.6
Nontreated		53.2	35.0

^aDaminozide concentrations were 5000 ppm twice for 'Bright Golden Anne' and 2500 ppm once for 'Pert'.

Chrysanthemum. Paclobutrazol and XE-1019 was effective in controlling plant height when applied as a drench or spray, and increasing concentrations generally resulted in shorter plants (Table 2). 'Bright Golden Anne' is normally produced taller than 'Pert' and the chemical concentrations providing plant heights similar to the daminozide standard treatment was different for the two cultivars. The optimum concentration was generally lower for 'Pert' compared to 'Bright Golden Anne.'

The media used in this study did not contain pine bark. It has been shown that pine bark reduces the efficacy of

paclobutrazol (1). It would be expected for the same to be true for XE-1019, since the two molecules are so similar.

Paclobutrazol as a spray at 200 ppm produced 'Bright Golden Anne' plants similar to XE-1019 at 25 ppm, which indicates that it takes about eight times as much paclobutrazol as XE-1019 to produce the same result. In the drench applications, the paclobutrazol concentration at 10 times the XE-1019 provided similar results.

These studies indicate that these new growth retardants are effective for height control on execum and chrysanthemum. XE-1019, which is chemically similar to paclobutrazol and RSW-0411, is more active than the later two. These results are similar to comparisons between XE-1019 and paclobutrazol on other species (4, 5).

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