

PLANT GROWTH REGULATORS IN FLORICULTURE: BULB CROPS

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ABSTRACT

Height control is often necessary for potted flowering plants to market a quality product (Whipker et al., 2003). Bulb crops, such as lily and caladium, require some degree of height control to prevent stem stretch during production, to obtain a proportional plant to the pot used, and to meet size requirements for shipping. For other bulb species (tulip, hyacinth, and narcissus), stem stretch does not occur during production, but during the marketing and consumer phases of the crop. Currently, growers have a number of plant growth regulator (PGRs) options to use to control stem stretch and another product will become available by the end of 2004. Flurprimidol which has been sold under the trade name Topflor in Europe as a 1.5% formulation will be released for use in the United States as a 0.38% formulation (M. Bell, personal communication). Flurprimidol has been shown to be effective at controlling plant height for a number of bulb species. As with any new tool offered to growers, experience is necessary to become comfortable with its use, flurprimidol is no exception. Flurprimidol has been tested using pre-plant bulb soaks, substrate drenches, and foliar sprays as application methods on bulb crops. A summary of the results and comparisons to current recommended concentrations of commonly used PGRs based on research reported by Krug (2004) are covered below in the text and listed in Table 1.

Concentration Comparisons

Tulip. A pre-plant bulb soak of 50 mg·L⁻¹ paclobutrazol was required to control stem stretch. A uniconazole pre-plant bulb soak of 10 mg·L⁻¹ controlled stem stretch. Flurprimidol provided stem stretch control as a pre-plant bulb soak as a concentration 10 to 25 mg·L⁻¹, depending on cultivar. These concentrations were less than half the concentration required for paclobutrazol and equal to 2.5 times the concentration required for uniconazole. Paclobutrazol applied as a substrate drench required a dose of 1 mg a.i. per pot to control stem stretch. Flurprimidol and ancymidol substrate drenches required half the dose, 0.5 mg a.i. per pot, to provide stem stretch control. Flurprimidol applied as a foliar spray was effective, but only at concentrations ≥ 80 mg·L⁻¹. Multiple applications should be explored for foliar spray applications or be considered for cultivars which only need minimal height control during post-harvest.

Caladium. Pre-plant bulb soaks of 2.5 to 40 mg·L⁻¹ of flurprimidol or paclobutrazol were not effective on 'Red Flash' caladiums. The lack of control from pre-plant bulb dips coupled with the potential to spread a common disease of caladium bulbs, bacterial soft rot (*Erwinia carotovora*), indicates that other application methods should be used. Substrate drenches of flurprimidol and paclobutrazol at a dose of 2 mg a.i. was required to control plant height.

Hyacinth. A pre-plant bulb soak of 100 mg·L⁻¹ paclobutrazol was required to control stem stretch. A uniconazole pre-plant bulb soak of 20 mg·L⁻¹ did not provide adequate control of stem stretch and 40 mg·L⁻¹ provided excessive control. Concentrations between 20 and 40 mg·L⁻¹ should be explored. Flurprimidol provided stem stretch control as a pre-plant bulb soak as a concentration 10 to 25 mg·L⁻¹, depending on cultivar. Paclobutrazol concentrations were 5

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to 10 times the concentration of flurprimidol required and uniconazole concentrations were 1.5 to 2 times the concentrations of flurprimidol required for stem stretch control. A substrate drench of flurprimidol at a dose of 1 mg a.i. per pot was required to control stem stretch.

'*Star Gazer*' *Oriental lily*. A uniconazole pre-plant bulb soak at a concentration of 5 mg·L⁻¹ was required to control stem stretch. A flurprimidol pre-plant bulb soak at 25 mg·L⁻¹ was required, which is 5 times the concentration of uniconazole required to control stem stretch. A substrate drench of 0.5 mg a.i. per pot flurprimidol provided control of stem stretch.

Growers will still need to conduct on-site trials to determine optimal concentrations under their cultural practices and different cultivars. The use of pre-plant bulb soaks offer growers flexibility of when to apply PGRs and will be an addition tool to assist in producing quality plants.

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Table 1 Concentration comparisons for flurprimidol, ancymidol, daminozide, ethephon, paclobutrazol, and uniconazole applied as pre-plant bulb soaks, substrate drenches, or foliar sprays on bulb crops.

	Pre-Plant Bulb Soaks (mg L ⁻¹)				Substrate Drenches (mg a.i. per pot)				Foliar Sprays (mg L ⁻¹)					
	Flurprimidol	Ancymidol	Paclobutrazol	Uniconazole	Flurprimidol	Ancymidol	Paclobutrazol	Uniconazole	Flurprimidol	Ancymidol	Daminozide	Paclobutrazol	Ethephon	Uniconazole
Tulip	10-25 ^z (10 min)		50 (10 min)	10 (10 min)	0.5 (8.5 ppm)	0.5 (8.5 ppm)	1 (16.9 ppm)	SR ^x 1-3 ppm	≥ 80	NS				SR ^x 2.5-20
Caladium	NR (1.25-40; 10 min)		NR (2.5-40; 10 min)	SR ^x 1-10 (1-5 min)	2 (16.9 ppm)	SR 2 ppm	2 (16.9 ppm)	NR (0.25-4)		SR ^x 25-50	2,500 3X ^y	100-200 ^x		SR ^x 2.5-20
Hyacinth	10-25 ^z (2-10 min)		100 (10 min)	20-40 ^z (10 min)	1 (16.9 ppm)	SR 2 ppm	SR ^x 10 ppm	SR ^x 1-3 ppm		SR ^x 25-50		SR ^x 100	NR (250-2000)	SR ^x 2.5-20
Oriental Lily	25 (10 min)	4 ^w (30 min)	100-200 ^v (5 min)	5 (10 min)	0.5 (4.2 ppm)	0.125-1 ^{y,u} (1.1-8.5 ppm)	4-30ppm ^x	0.05-0.3 ^{y,v,t} (0.42-2.54 ppm)	≥ 80	0.5 mg a.i. per pot ^w		200-500 ^x		5-15 ^s

SR (Suggested Rate) – Label lists no specific recommendation, only suggested experimental range.

NR (No Response) – at the concentrations trialed there was no plant response (rates trialed).

NS (Not Suggested) – Label does not recommend its use

^z – Concentration range varies due to cultivar response

^y – Dole and Wilkins (1999)

^x – Product label

^w – Wilkins and Gruber (1983)

^v – Miller et al. (1998)

^u – Whipker and Hammer (1993)

^t – Bailey and Miller (1989a)

^s – Bailey and Miller (1989b)