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Influence of Pine Bark on the Efficacy of Different Growth Retardants Applied as a Drench

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***Abstract. Dendranthema* ×*grandiflorum* (Ramat.) were grown in either a peat-based or pine bark–based medium and drenched with growth retardants at a range of concentrations to generate dose : response curves. The effect of ancymidol, paclobutrazol, and uniconazole on stem elongation was less in the pine bark–based than in the peat-based medium. Generally, the concentrations required to achieve the same response were 3- to 4-fold as high in the pine bark–based medium as in the peat-based medium. However, chlormequat was slightly more active in the pine bark–based medium than in the peat-based medium. Chemical names used: α-cyclopropyl-α–(4-methoxyphenyl)-5-pyrimidinemethanol (ancymidol); (±)-(R*,R*)-β-[(4-chlorophenyl)methyl]-α-(1,1-dimethyl)-1*H*-1,2,4-triazole-1-ethanol (paclobutrazol); (E)-(RS)-1-(4-chlorophenyl)-4,4-dimethyl-2-(1*H*-1,2,4-triazol-1-yl)pent-1-en-3-ol (uniconazole); 2-chloroethyltrimethylammonium chloride (chlormequat).**

Efficacy of growth-retardant drenches is dependent upon growing medium composition (Barrett, 1982; Bonaminio and Larson, 1978; Million et al., 1998; Newman and Tant, 1995). Information on the relative response of plants to growth retardants in different media is needed, as growth-retardant drenches are becoming more important in commercial floriculture.

Materials and Methods

We evaluated the dose : response curves of four growth retardants applied as drenches to two commercial media: a) Vergro Klay Mix A (Verlite Co., Tampa, Fla.), a peat-based medium comprising 50% (volume basis) sphagnum peat, 20% vermiculite, 20% perlite, and 10% calcined clay (VKMA), and b) Metro Mix 500 (Scotts Co., Atlanta), a bark-based medium comprising 20% sphagnum peat, 30% vermiculite, 40% composted pine bark, and 10% processed pine bark ash (MM500). One rooted cutting of 'Nob Hill' chrysanthemum [*Dendranthema* ×*grandiflorum* (Ramat.)] was planted per 12.5-cm (850-mL) pot filled with either medium.

Plants were not pinched and were grown under artificial long-day conditions (incandescent lighting from 2200 to 0200 HR) in a greenhouse with average minimum and maximum temperatures of 24 and 30 °C, respectively. Plants were fertilized at every watering with a 20N–4.4P–16.6K (Scotts Co.) fertilizer solution containing N at 300 mg·L^{-1}. Two weeks after transplanting, plants were treated with one of four growth retardants, each applied at six concentrations in 90-mL drench volumes. Drench concentrations were 0, 0.25, 0.5, 1, 2.5, and 5 mg·L^{-1} for ancymidol and paclobutrazol; 0, 0.1, 0.25, 0.5, 1, and 2.5 mg·L^{-1} for uniconazole; and 0, 500, 1000, 2500, 5000, and 10,000 mg·L^{-1} for chlormequat.

Plant height was measured at time of treatment and 4 weeks later. Data are expressed as stem elongation between measurements. The experimental design was a randomized complete block with four blocks and three pots per treatment within each block. Exponential decay curves were fitted to the data using a derivative-free (DUD) nonlinear regression procedure (PROC NLIN) (SAS Institute, 1996). Because a significant media × concentration interaction was observed for each growth retardant, regression curves were fitted for each chemical–media combination.

Results and Discussion

The efficacy of ancymidol, paclobutrazol, and uniconazole (Fig. 1) was less in MM500 than in VKMA; in general, their efficacy was

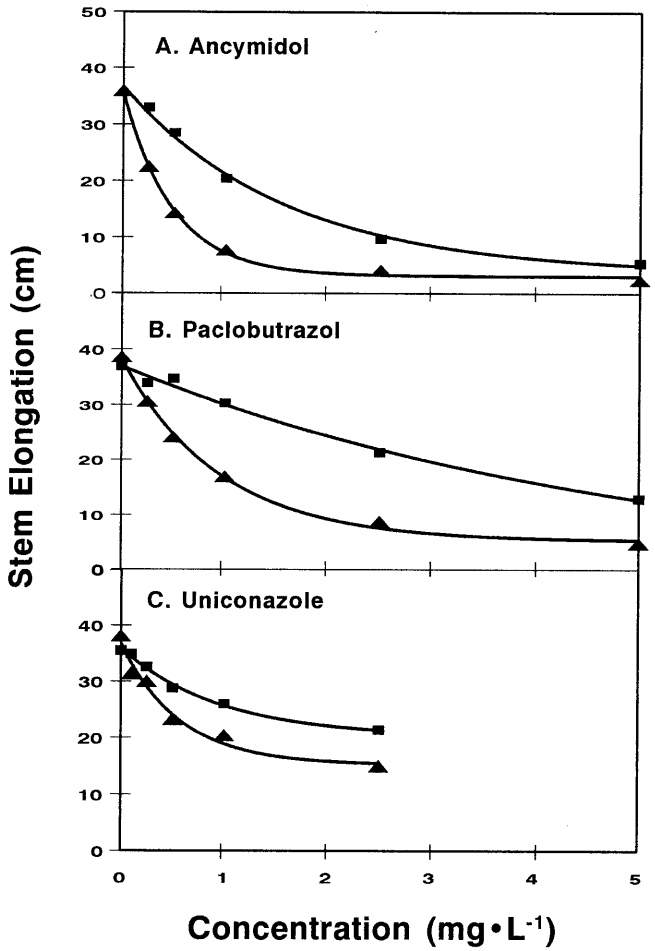

Fig. 1. Stem elongation of 'Nob Hill' chrysanthemum following drench treatment with (**A**) ancymidol, (**B**) paclobutrazol , or (**C**) uniconazole in Metro Mix 500 and Vergro Klay Mix A. Regression equations were: (**A**) MM500 (■), $y = 3.6 + 33.0e^{-0.64x}$, $r^2 = 0.93$; VKMA (▲), $y = 3.1 + 32.6e^{-2.09x}$, $r^2 = 0.96$; (**B**) MM500 (■), $y = -1.2 + 38.2e^{-0.20x}$, $r^2 = 0.86$; VKMA (▲), $y = 5.3 + 32.9e^{-1.06x}$, $r^2 = 0.93$; and (**C**) MM500 (■), $y = 20.3 + 15.6^{-1.07x}$, $r^2 = 0.68$; VKMA (▲), $y = 15.3 + 21.5e^{-1.78x}$, $r^2 = 0.86$.

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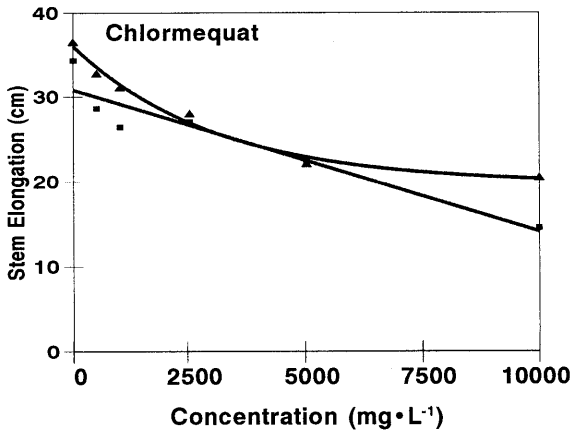

Fig. 2. Stem elongation of 'Nob Hill' chrysanthemum following drench treatment with chlormequat in Metro Mix 500 and Vergro Klay Mix A. Regression equations were: MM500 (■), $y = 30.8 - 0.00017x$, $r^2 = 0.67$; VKMA (▲), $y = 19.7 + 16.3e^{-0.0033x}$, $r^2 = 0.71$.

reduced to the same degree. For these chemicals, ≈3- to 4-fold higher concentrations were required to achieve the same response in MM500 as in VKMA. For example, the concentrations of ancymidol, paclobutrazol, and uniconazole required to achieve 25-cm stem elongation in VKMA were 0.19, 0.48, and 0.44 mg·L^{-1}, respectively; the respective concentrations in MM500 were 0.68, 1.87, and 1.13 mg·L^{-1}.

The response to chlormequat differed from the response to the other chemicals. Chlormequat was generally more effective in MM500 than in VKMA, but the differences in activity were neither consistent nor large (Fig. 2). These results with chlormequat support the report by Larson et al. (1974) that a pine bark–based potting medium did not reduce the activity of chlormequat. Chlormequat is an ionic compound, but ancymidol, paclobutrazol, and uniconazole are relatively nonpolar molecules, which are adsorbed by organic media components (Barrett, 1982). Million et al. (1998) reported that pine bark and peat reduced the efficacy of paclobutrazol, but the effect of pine bark was greater. They also found that the amount of adsorption of paclobutrazol varied with pine bark particle size and degree of decomposition.

In accordance with label recommendations, growers using pine bark–based media may need to apply higher concentrations of these chemical drenches than they would apply if using media not containing pine bark.

Literature Cited

Barrett, J.E. 1982. Chrysanthemum height control by ancymidol, PP333, and EL-500 dependent on medium composition. HortScience 17:896–897.

Bonaminio, V.P. and R.A. Larson. 1978. Influence of potting media, temperature, and concentration of ancymidol on growth of *Chrysanthemum morifolium* Ramat. J. Amer. Soc. Hort. Sci. 103:752–756.

Larson, R.A., J.W. Long, and V.P. Bonaminio. 1974. Relationship of potting mediums and growth regulators in height control. Flor. Rev. 155(4017):21, 59–61.

Million, J.B., J.E. Barrett, T.A. Nell, and D.G. Clark. 1998. Influence of media components on efficacy of paclobutrazol in inhibiting growth of broccoli and petunia. HortScience 33:852–856.

Newman, S.E. and J.S. Tant. 1995. Root-zone medium influences growth of poinsettias treated with paclobutrazol-impregnated spikes and drenches. HortScience 30:1403–1405.

SAS Institute. 1987. SAS/STAT guide for personal computers. vers. 6. 675–712. SAS Inst., Cary, N.C.