Effect of Timing of Applications on Plant Growth Retardant Efficacy and Growth of Non-Responsive Herbaceous Perennials

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Objectives: Typically these plants show vigorous growth and have a tendency to become overgrown or stretched prior to market date, making them less desirable to the consumer. Nursery growers have two options to control plant height: cut plants back or apply PGRs. The first option involves high input of manual labor. The second option is effective on many species but not on all (Anderson and Hartley, 1990; Karlsson and Werner, 1991; Keever and Gilliam, 1994; Latimer et al., 1998). Many species are unresponsive to PGR application, particularly under nursery conditions (Burnett et al., 2001). Growers often complain that some herbaceous perennials do not respond to PGRs. Why certain perennials are less responsive to PGRs is currently unknown. One possible cause for the non-responsiveness may be related to the plant cuticle. The cuticle can be surpassed if the growth retardant is applied as a drench. In addition, the PGR application can be delivered early in the growth stage when the cuticle is considerably thinner. Our objective is to determine if PGR efficacy on non-responsive perennials can be improved by combination of an early application of PGRs drenches in the plug stage and a later application at planting.

Procedures: Plugs of *Coreopsis* 'American Dream', *Phlox* 'Blue Boy', *Liatris* 'Floristan Violet', and *Physostegia* 'Red Beauty' were treated with 0, 0.05, 0.10, 0.15, or 0.2 ppm Sumagic or 0, 1.5, 3.0, 4.5, or 6.0 ppm Bonzi applied as a drench in the plug tray. The drench was applied to the plugs in the individual cells on April 1, 2002. Plugs were left in the plug tray until planting. They were planted on April 24, 2002 in full gallon pots containing McCorkles standard soil mix (pine bark, sand, Osmocote, and micronutrients). At planting plugs were treated 0, 5, 10, 15, or 20 ppm Sumagic or 0, 10, 20, 30, or 40 ppm Bonzi applied as a drench. The drench volume applied individually to each pot was 6 fl.oz. Each species was arranged in a completely randomized design, and the treatments were factorial ([PGR] x Rate). Data were collected on June 6, 2001 and July 11, 2002 and analyzed using general linear models and contrast statements in SAS. Data collected include plant height of all species, and width of Coreopsis. Growth index of Coreopsis was calculated from the following equation (plant height + plant width 1 + plant width 2)/3. Width 1 and Width 2 were taken perpendicularly to one another. Due to herbicide damage to the experimental plants, the data collected 10 weeks after treatment were not included.

Results: PGR applications resulted in significant decrease in plant height of both Coreopsis and Phlox (Tables 1 and 2). There was a significant linear decrease in height in both species treated with Bonzi or Sumagic. The 20 ppm Bonzi and 5 ppm Sumagic rates on Coreopsis appear to provide adequate height control when applied as a drench. The lowest height in Phlox was achieved with the highest

concentration of Bonzi, however, the 10 ppm rate induced lower height than the 20 or 40 ppm. This could be attributed to the variability in the plants and the low number

of replications (7). The Sumagic rates used in this study were very high and would be cost-prohibitive for growers to use in their regular cultural programs.

Data analysis showed that the height and growth index were not significantly different for Liatris and Physostegia for none of the PGRs at any application rate. However, Liatris grows from a basal crown and the main difference in height is due to growth of the inflorescence. Many of our plants were not flowering at the time of the data taking, but the PGR-treated plants that were flowering appeared shorter than the non-treated plants that were flowering.
Our results would indicate that the non-responsiveness to triazole PGRs, at least in Physostegia, is not related to the plant cuticle, but rather to a physiological mechanism via which this species grows in height.

Table 1. Effects of Bonzi and Sumagic drenches on growth of *Coreopsis* 'American Dream' and *Phlox* 'Blue Boy' 6 WAT.

	Coreopsis		Phlox	Physostegia	Liatris
PGR	Height (cm)	Growth Index	Height (cm)	Height (cm)	Height (cm)
Bonzi cc (ppm)					
0	25.2	27.3	18.4	20.6	13.4
10	20.0	22.4	16.8	20.7	15.2
20	15.8	21.5	18.0	22.4	15.3
30	13.5	16.9	17.3	19.6	13.7
40	12.2	17.8	15.3	21.3	14.6
	L*	L*	L*	NS	NS
Sumagic cc (ppm)					
0	25.2	27.3	18.4	20.6	13.4
5	12.0	16.3	12.6	20.1	14.3
10	14.3	18.3	11.4	20.0	12.3
15	15.3	19.3	11.0	17.8	14.7
20	5.5	10.3	11.1	16.4	15.6
	L*	L*	L* Q*	NS	NS

* Linear and Quadratic contrasts were conducted with SAS; effects were considered non-significant at the P # 0.05 level.

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