# The Effect of Application Method on PGR Efficacy and Growth of Herbaceous Perennials

**Paul A. Thomas and Stephanie E. Burnett**
**Department of Horticulture - Athens**
**The University of Georgia**

## Objectives:

Herbaceous perennials grow rapidly, becoming pot-bound, top heavy, difficult to maintain, and expensive to ship (Davis and Curry, 1991). Often, chemical plant growth retardants (PGRs) are used to control the growth of herbaceous perennials (Anderson and Hartley, 1990; Karlsson and Werner, 1991; Keever and Gilliam, 1994; Latimer et al., 1998). However, many species are unresponsive to PGR application, particularly under nursery conditions (Burnett et al., 2001). The use of surfactants often increases uptake of chemicals, including PGRs in plant tissue. Therefore, the primary objective of this research was to determine if applying PGRs with the addition of a known quantity of surfactant would increase PGR efficacy.

## Procedures:

Plugs of *Eupatorium coelestinum*, *Aquilegia* sp., *Oenothera missouriensis*, *Gallardia* × *grandiflora*, *Monarda didyma*, and *Physostegia virginiana* were planted in full gallon pots containing McCorkle's standard soil mix (pine bark, sand, Osmocote, and micronutrients) On . On 2 May, 2001, plants were fertilized once with 20-20-20 at 200 ppm. Plants were treated with foliar sprays of 0, 50, 100, or 150 ppm of A-Rest, Sumagic, Bonzi, and Apogee with and without 1 ml of Latron 156 B (surfactant). Sprays were applied at a rate of 500 mls/12.5 $ft^2$ using a $CO^2$ sprayer at 20 psi. Each species was arranged in a completely randomized design, and the treatments were factorial ([PGR] × Surfactant). Data were collected on 5 July, 2001 and analyzed using general linear models and contrast statements in SAS. Data collected include, height, leaf length, and the presence or absence of inflorescence.

## Results:

No significant results were seen when surfactant was used with the plant growth regulator solution (Data not shown). This may be due to the adversely hot weather conditions, or to the type of leaf structure. All of the species tested were known to be difficult to control cultivars. Many of the species we chose to test had either waxy cuticles or hair leaves (trichomes) that have been reported to reduce the efficacy of PGR treatments. Surfactants allow the solutions to adhere to the leaves, thus theoretically allowing a longer period of absorption into the leaves. It may be that commonly used surfactants were not able to penetrate these structures, or that the excessively dry, hot weather affected the treatments, either through excessive irrigation or other physiological means.

PGR applications to Gaillardia resulted in significantly different leaf lengths (P = 0.0226), however, upon scrutiny of specific contrasts, none of the PGRs significantly affected leaf length according to linear and quadratic statements (Table 1). Height and inflorescence were not significantly different for Gaillardia, and height was not significantly different for Monarda. It is possible that the lack of significant results could be explained by several factors. Most herbaceous perennials are more difficult to control in a nursery environment than in a controlled greenhouse environment. In a nursery, plants are exposed to rigorous weather, heavy overhead irrigation, and less precise fertility. As stated above, the morphology may be the barrier to the solution entering the leaf. Any of these factors, along with differences in stage of growth, and rate of growth determined by the hot weather, could have decreased PGR efficacy. We specifically chose difficult to control plants for this study. It is possible that the plants grew so rapidly that the PGR rate chosen, with or without a surfactant, was not substantial enough to slow down the growth of these plants.

**Conclusion**:

Our data does not support the addition of surfactants to plant growth regulating solutions as a way to increase efficacy. More work will be needed to determine if surfactants are effective. Our study does confirm what nursery growers have been reporting; that "greenhouse study rates" of plant growth regulators for perennials do not work as well in the field. Drench applications may provide greater potential for height control in the nursery and are typically reported to be more effective and persist longer in the soil in greenhouse studies. Our studies in this are will continue.

**Literature Cited:**


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**Table 1. Effects of PGR Application on Growth of *Gallardia* × *grandiflora*.**

| PGR | Concentration (ppm) | Height (cm) | Leaf Length[1] (cm) |
|---|---|---|---|
| Bonzi | 0 | 17 | 14 |
| | 50 | 18 | 10 |
| | 100 | 19 | 13 |
| | 150 | 19 | 12 |
| | | NS[2] | NS |
| Sumagic | 0 | 17 | 14 |
| | 50 | 18 | 12 |
| | 100 | 17 | 14 |
| | 150 | 18 | 12 |
| | | NS | NS |
| A-Rest | 0 | 17 | 14 |
| | 50 | 19 | 14 |
| | 100 | 21 | 13 |
| | 150 | 18 | 13 |
| | | NS | NS |
| Apogee | 0 | 17 | 14 |
| | 50 | 21 | 15 |
| | 100 | 20 | 13 |
| | 150 | 20 | 13 |
| | | NS | NS |

[1]Leaf Length of the newest mature leaf was measured from base to tip.
[2]Linear and Quadratic contrasts were conducted in SAS; effects were considered non-significant when the P-Value was # 0.05