



# Solving the Perennial Problem

More and more growers are supplementing their bedding plant mix with perennials, and they are learning that with this new crop comes many of the same old problems. Research from the UC Cooperative Extension points growers in the right direction for height control on many common perennials.

By Gary Hickman

**A**s consumers rediscover the ease and beauty of perennials and start to clamor for more varieties, growers must find ways to control the growth of this sometimes unruly group. Plant growth regulators (PGRs) can be an effective method of control, but just as with annuals, growers must keep many factors in check.

## PERENNIALS AND PGRS: AN UNPREDICTABLE PAIR

Plant growth regulators can be used on a variety of ornamental perennial plants and can also be used on some species to induce flowering and increase lateral branching. However, unlike some other chemicals, such as insecticides or fungicides, many PGRs produce different responses in different species, and even cultivars, of ornamental plants.

Timing of application, dosage and the potential need for multiple applications must be determined for each species or cultivar treated. Rates that are too low, too high or improperly timed for the cultivar may result in an ineffective treatment at one extreme

and phytotoxicity at the other. Even the method of application — spray or drench — often affects the results.

This response difference is based on the chemical's mode of action in the plant. Paclobutrazol, ancymidol and chlormequat, for example, are gibberellin biosynthesis inhibitors. By partially inhibiting the synthesis of gibberellin in plants, these chemicals produce internode compression on a wide variety of ornamental plants. You can reverse the effects of this group of plant growth regulators with the application of gibberellic acid.

The primary method of plant uptake is through the xylem. Because of this, soil or stem applications are usually the most effective method of applying PGRs. Spray treatments usually must have enough volume of solution applied to reach the stem for effective control. Adverse environmental or cultur-



*Without the benefits of PGRs, many perennials become a tangled mess. (Photos courtesy of Gary Hickman)*

*Table 1. Effective Treatments for Height Control of Perennial Ornamental Plants*

CULTIVAR	SIZE	METHOD OF APPLICATION	TREATMENT
<i>Arenaria montana</i> 'Avalanche'	plug	spray	5 ppm paclobutrazol *
<i>Artemesia absinthium</i> 'Silver Mound'	1-gallon	spray	50 ppm paclobutrazol
<i>Cosmos bipinnatus</i> 'Sonata'	4-inch	spray	40 ppm paclobutrazol
		drench	1 ppm paclobutrazol
<i>Coreopsis verticillata</i> 'Rosea'	6-inch	spray	40 ppm paclobutrazol
		drench	2 ppm paclobutrazol
Coreopsis 'Sonnekind'	plug	spray	2,500 ppm daminozide +5 ppm paclobutrazol
Dianthus 'Stagirond'	plug	spray	2,500 ppm daminozide + 1,250 ppm chlormequat chloride
		spray	5 ppm paclobutrazol
<i>Digitalis purpurea</i> 'Foxy'	1-gallon	spray	15 ppm ancymidol
		drench	4 ppm ancymidol
Fuchsia 'Swingtime'	4-inch	spray	50 ppm paclobutrazol
		drench	5 ppm paclobutrazol
<i>Gaura lindheimeri</i>	1-gallon	spray	3,000 ppm daminozide
		spray	50 ppm paclobutrazol
Hemerocallis 'Irish Elf'	1-gallon	spray	50 ppm paclobutrazol*
<i>Monarda citriodora</i>	3-inch	spray	160 ppm paclobutrazol
<i>Solidaster luteus</i> 'Tara'	1-gallon	spray	2,500 ppm daminozide + 30 ppm paclobutrazol
Veronica 'Sunny Border Blue'	1-gallon	spray	2,500 ppm daminozide + 20 ppm paclobutrazol

\* Treatment delayed flowering.

The plant growth regulators used for this study were: paclobutrazol (Bonzi); daminozide (B-Nine); chlormequat chloride (Cycocel); ancymidol (A-Rest).

al conditions, which cause plant stress, can also affect PGR efficacy. It is also important to note that most current product labels, although often registered for a wide variety of ornamentals, usually give only general application rates, suggesting local trials to determine optimum rates.

**A PERENNIAL STUDY**

For many greenhouse-grown perennials, effective height suppression can be difficult. Over the past few years, our research has included 24 species of common perennials and four chemicals used at various rates and combinations. Plant pot sizes have included 1-gallon pots that were grown outside; 3- to 6-inch pots that were grown in the greenhouse; and plugs in the 1-2 true leaf stage that were grown in the greenhouse. Each of our trials was conducted under commercial production conditions, including temperature, humidity, irrigation and fertilization. All label requirements were followed, including dosages per plant or area and recommended plant size at time of treatment. In most of the trials, one or two chemicals or a combination of chemicals

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Figure 1. Final PGR Effects on dianthus

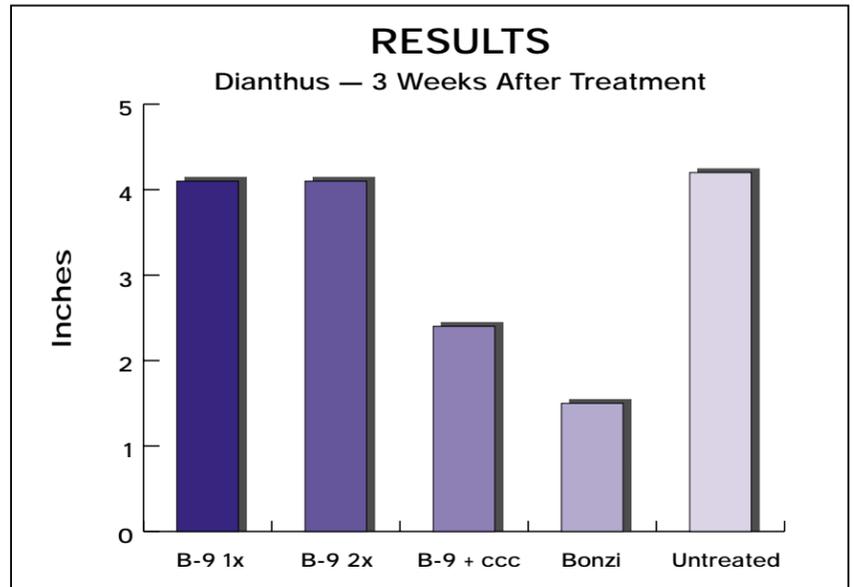


Figure 2. PGR effects on dianthus over time

Treatment	1 Week	2 Weeks	3 Weeks
B-9 1x	1.6 a	2.8 b	4.1 a
B-9 2x	1.6 a	2.8 b	4.1 a
B-9 + ccc	1.1 b	1.6 c	2.4 b
Bonzi	1.2 b	1.3 c	1.5 c
Untreated	1.8 a	3.4 a	4.2 a

produced the best results. If more than one rate of a chemical produced significant height control, only the lowest effective rate is listed in Table 1, page 23. The desired height

for sale, without phytotoxic effects, was used as the criteria to judge an effective treatment outcome. In a few cases, delayed flowering from the treatment was noted; this information is included in the table. Trials combining every plant size and chemical were not completed for all species. Therefore, if the effective treatment noted for a particular plant was for 1-gallon containers, for example, additional trials would be necessary on other sizes before wide-scale applications were conducted. Also, since many of the plants listed in these trials are available as several different cultivars, the rates given here should only be considered as starting points for additional research.

### OTHER EFFECTS OF PGRS ON PERENNIALS

In addition to height control, many of the commonly used PGRs may also alter plant water use. Plant growth regulators can prevent water stress by decreasing plant water use. This is due to smaller leaves, or fewer stomata in the leaves. There may also be an effect on the relative number of roots in treated plants; however, this response is variable among species. In some plants, treatment with PGRs results in noticeably darker green leaves, a desired effect in most cases. This response is a result of smaller but thicker leaves, creating a higher relative chlorophyll content.

As with all chemicals, and especially PGRs, it is very important to carefully read and follow all label directions. It is also recommended that you try small-scale trials of any new application before treating on a large scale.

There are a great number of variables when applying PGRs to perennials in the greenhouse. But overall, PGRs can be extremely effective in controlling the height of perennials. If growers keep records of their successes and failures and conduct their own small trials, consistent and effective treatments can and will result. GPN

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