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# GROWER TALKS

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## Growth Regulators for Containerized Herbaceous Perennial Plants

**A Guide to  
Growing  
High-Quality  
Perennials**

**2018-19**

By Joyce G. Latimer, Department of Horticulture, Virginia Polytechnic Institute and State University, Blacksburg, Virginia

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# Tank Mixing Configure (BA) with Plant Growth Retardants Improves Branching

By Joyce G. Latimer & Holly L. Scoggins, Virginia Tech

Although breeding and selection has resulted in more attractive growth habits in popular herbaceous perennials, greenhouse and nursery growers are still faced with challenges in managing the growth and branching of many of these perennials grown in containers. Growth retardants can control overall growth and improve toning of treated perennials, but frequently result in less branching on many crops.

In our studies, we've found that branching of many of the herbaceous perennials can be enhanced with applications of Configure (BA, benzyladenine). The objective of these studies was to evaluate tank mix combinations of Configure with Dazide (daminozide) or Piccolo (paclobutrazol) for effects on growth control and branching of herbaceous perennials. Tank mixes are generally designed to provide a more efficient or positive effect as in additive, enhanced or synergistic effects.

## Tank mix evaluations of Configure and Dazide

For the Configure plus Dazide study, unrooted cuttings were purchased and rooted. Growth regulators were applied at Stage 3 rooting (just after liners were removed from mist; roots visible on all sides). All growth regulators were applied as a single foliar spray at the label-recommended volume of 1 gal. per 200 sq. ft. We tested three crops: Agastache Tutti Frutti, Rosmarinus Hill Hardy and Gaura Whirling Butterflies with the following treatments:

- Untreated control
- 500 ppm Configure
- 2,500 ppm Dazide
- Tank Mix = 500 ppm Configure + 2,500 ppm Dazide

Finished liners were evaluated for height and/or width, shoot dry weight and number of branches at three weeks after treatment. An additional set of liners was potted into quart pots and finished plants were evaluated five weeks after potting.

Agastache Tutti Frutti liners treated with Configure alone were 45% shorter than untreated liners, but had more branches and comparable shoot dry weight (Table 1, Figure 1). Dazide alone greatly reduced plant growth with final liner height 70% shorter than that of untreated plants, with fewer branches and 30% less shoot dry weight. ▶

Table 1. Agastache Tutti Frutti liners at three weeks after treatment. Dazide resulted in less plant height, fewer branches and less shoot dry weight, while Configure alone or in the Tank Mix increased branching and maintained plant mass at levels comparable to that of the untreated plants without eliminating height control.

PGR application	Plant height (cm)	Number of branches	Shoot dry weight (mg)
Untreated	17.2a	9.3c	382a
Configure 500 ppm	9.4b	11.4b	433a
Dazide 2500 ppm	5.2c	6.2d	262b
Configure 600 ppm + Dazide 2500 ppm	10.0b	15.0a	404a
Rate effect	***	***	***

\*\*\*Rate effect significant at  $p < 0.0001$ .



Figure 1. Liners of Agastache Tutti Frutti at three weeks after treatment (left to right): Untreated control, 500 ppm Configure, 2,500 ppm Dazide, or a Tank Mix of 500 ppm Configure + 2,500 ppm Dazide.

## Cutting-Edge PGRs

The Tank Mix of Configure + Dazide controlled liner height while increasing the number of branches over that of liners treated with Configure alone. In addition, the shoot dry weight of liners treated with the Tank Mix was 35% greater than that of liners treated with Dazide alone, resulting in liners of comparable mass to that of untreated plants.

In the finished agastache plants five weeks later, the number of branches on plants treated with Configure or the Tank Mix was still greater than that of the untreated or Dazide-treated plants. In addition, shoot dry weight of the finished plants was also affected by the growth regulators. While plants treated with Dazide alone had 20% less mass than untreated plants, those treated with the Tank Mix had 20% greater mass than untreated plants, while maintaining height control. Flower height of the plants treated with any of the growth regulators was 25% less than that of untreated plants.

In liners of Rosmarinus Hill Hardy, Configure alone didn't significantly increase the number of branches while Dazide alone reduced branching (Figure 2). In Gaura Whirling Butterflies, Configure alone increased the number of branches, while Dazide alone again reduced branching. In both crops, the Tank Mix restored the number of branches to numbers similar to those of the untreated plants.

Configure alone or in the tank mix with Dazide delayed flowering of Gaura Whirling Butterflies by about 10 days (Figure 3). However, since this was primarily during the liner rooting phase, it may have been advantageous. Shoot dry weight of the liners wasn't significantly affected by the growth regulator applications.

In finished gaura plants, there were no differences in plant height or shoot dry weight, but plants treated with Dazide alone still had the fewest number of branches (10 per plant) and plants treated with Configure alone had the greatest number of branches (20.8 per plant) at eight weeks after treatment.

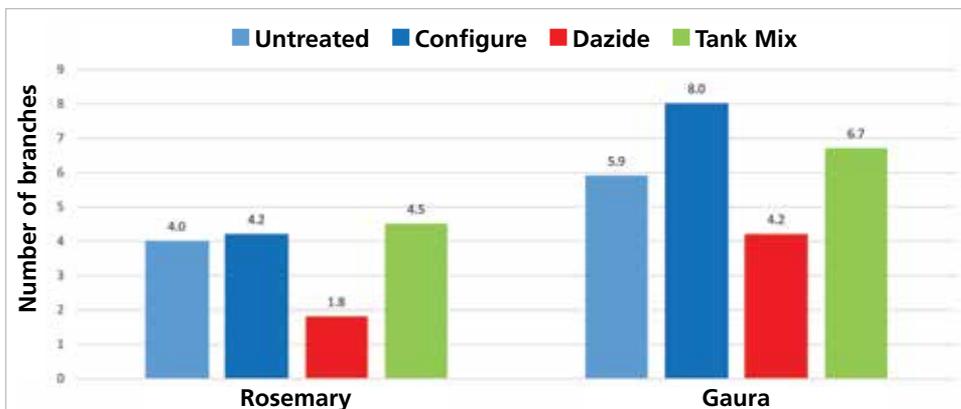


Figure 2. The number of branches of Rosmarinus Hill Hardy or Gaura Whirling Butterflies liners at three weeks after treatment (left to right for each crop): Untreated control, 500 ppm Configure, 2,500 ppm Dazide, or a Tank Mix of 500 ppm Configure + 2,500 ppm Dazide.



Figure 3. Gaura Whirling Butterflies liners at three weeks after treatment (left to right for each crop): Untreated control, 500 ppm Configure, 2,500 ppm Dazide, or a Tank Mix of 500 ppm Configure + 2,500 ppm Dazide.

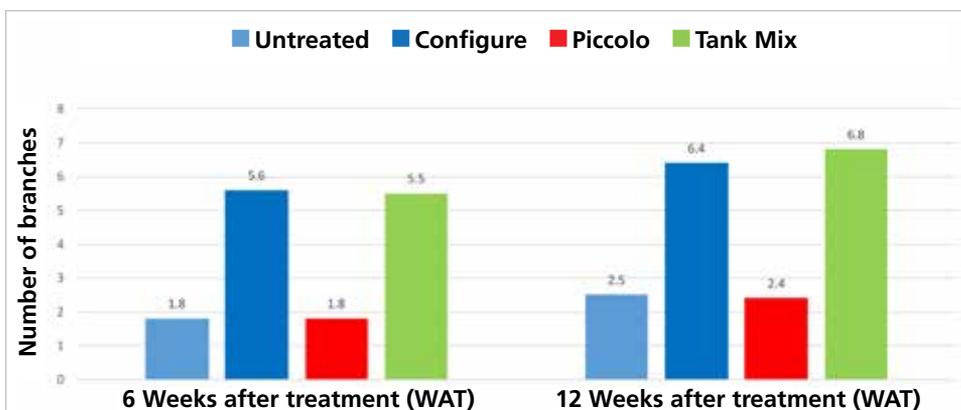


Figure 4. Configure alone or in the Tank Mix increased the numbers of branches of Echinacea Doubledecker plants at six or 12 weeks after treatment (WAT). Left to right: Untreated control, 600 ppm Configure, 120 ppm Piccolo, or a Tank Mix of 600 ppm Configure + 120 ppm Piccolo.

## Echinacea 'Doubledecker'



Figure 5. Piccolo alone or in the tank mix reduced plant height of Echinacea Doubledecker plants at four weeks after treatment. Left to right: Untreated control, 600 ppm Configure, 120 ppm Piccolo, or a Tank Mix of 600 ppm Configure + 120 ppm Piccolo.

## Heuchera 'Silver Lode'



Figure 6. Configure alone or in the tank mix increased the number of branches of Heuchera Silver Lode plants at four weeks after treatment (WAT). Left to right: Untreated control, 600 ppm Configure, 120 ppm Piccolo, or a Tank Mix of 600 ppm Configure + 120 ppm Piccolo.

### Tank mix evaluations of Piccolo and Configure

For the Configure plus Piccolo studies, liners were purchased from a commercial source and potted shortly after arrival. The growth regulators were applied 10 to 14 days after potting. All growth regulators were applied as a single foliar spray at the label-recommended volume of 1 gal. per 200 sq. ft. Plants were evaluated for height and/or width and number of branches.

For our tank mix evaluations of Configure and Piccolo, we tested Echinacea Doubledecker and Heuchera Silver Lode. Our evaluation treatments were:

- Untreated control
- 600 ppm Configure
- 120 ppm Piccolo
- Tank Mix = 600 ppm Configure + 120 ppm Piccolo

As expected, Echinacea Doubledecker plants responded to Configure treatments, alone or in the Tank Mix application, with an increase in branching (Figure 4). Piccolo reduced plant growth moderately, but didn't affect branching relative to the untreated controls. Improvements in branching in plants treated with Configure or the Tank Mix persisted through 12 WAT.

Notice that Configure or Piccolo alone caused some puckering of the leaves, typically a sign of overdose (Figure 5). This

puckering was much worse in plants treated with the tank mix. These symptoms were only seen on leaves present at the time of treatment. Finished plants typically had new leaves covering these damaged ones. However, we suggest that you reduce the rates of both growth regulators.

Heuchera Silver Lode showed no significant height response to Piccolo and Piccolo had no effect on the number of basal branches relative to untreated plants at 4 WAT (Figure 6). However, Configure or the Tank Mix increased branching relative to that of untreated plants.

In summary, we found no evidence of synergism, which we would define as an improvement in both growth regulation and branching, when using Configure and growth retardants together in these tank mixes. However, we generally found a positive effect on plant branching when Configure was combined with the plant growth retardants. In addition, Configure tended to increase dry weight accumulation by plants treated with the Tank Mix as compared to plants treated only with the growth retardant. Combining Configure with growth retardant applications may improve branching and mass of the finished plants without reducing the growth regulation effects of the growth retardants. 🍷

Joyce Latimer is a professor of horticulture and Holly Scoggins is an associate professor of horticulture at Virginia Tech in Blacksburg, Virginia.

# Using Dazide and Concise to Control Growth of Hybrid Echinacea

By Mara C. Grossman, Holly L. Scoggins & Joyce G. Latimer, Virginia Tech

Growers and consumers appreciate all of the exciting new flower colors and forms of hybrid echinacea cultivars, however, in production, some hybrids can grow to be overly tall.

In our previous research, we've used different PGRs to control the height of echinacea cultivars. We found that Echinacea Harvest Moon was more compact after spray or drench treatment with Concise (uniconazole) or Piccolo 10 XC (paclobutrazol) or spray applications of Dazide (daminozide). However, while Echinacea Marmalade was shorter in response to spray applications of Dazide, flowering in finished plants was diminished.

In this study, we wanted to determine the effectiveness of a mixed growth regulator approach using Dazide during liner development and Concise after liner transplant in order to meet the goal of compact liners and finished plants without negative effects on flowering.

## Materials & methods

As part of a 20-cultivar evaluation, Echinacea Julia tissue culture plantlets were transplanted into a peat and pine bark substrate and acclimated to greenhouse conditions under a 16-hour photoperiod. To enhance branching, a 300 ppm Concise (benzyladenine) spray was applied to all liners at 40 and 57 days after transplant. Plants were divided into two groups, one control group not treated with growth retardants and one group that received two foliar applications of 2,500 ppm Dazide at six and eight weeks after transplant. Liner growth was assessed at 10 weeks after transplant after which liners were planted into quart containers.

Four weeks after planting, foliar applications of 15 ppm Concise were applied to plants in the growth retardant treatment. The study ended when plants were in flower at nine weeks after planting (19 weeks after initial tissue culture transplant).

## Liner results

Liners were ready for planting to quart containers at 10 weeks after transplant of tissue culture plantlets. At this time, liners



Echinacea Julia liners at 10 weeks after transplant of tissue culture plantlets, untreated on the left or treated twice with 2,500 ppm Dazide on the right.

treated with Dazide were significantly shorter than those without (3.3 in. for Dazide vs. 4.2 in. for untreated plants). Plant width, number of branches and rooting weren't affected by Dazide applications.

## Finished plant results

Finished plants treated with growth retardants were shorter than those without (17.6 in. compared to 22.2 in. for untreated plants). Plant width, days to flower and number of flower stalks weren't affected by growth retardant applications. Although the number of branches was greater in plants without height control treatment (13 branches compared to 10 branches in those treated with growth retardants), all plants were well branched and fully filled the containers.

## Conclusions

Echinacea Julia plants were significantly more compact following growth retardant applications, both as liners and as finished plants. Rooting and flowering weren't affected by PGR treatment.

We followed this PGR protocol on other echinacea hybrid cultivars as well, most with good success. The key to obtaining good height control with PGRs in echinacea is proper timing of the applications. In the liner stage, we applied growth retardants when liners were well rooted and stems were just beginning to elongate. After planting to quart pots, we applied Concise as a foliar spray after flower stalks developed, but prior to their elongation. Although Julia only required one application of Concise, some cultivars required additional applications as flower stems elongated. ⑤



Echinacea Julia finished plants at 9 weeks after planting liners, untreated on the left or treated with Dazide and Concise on the right.

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# Fresco Use Tips

By Brian Whipker, North Carolina State University

When one thinks of plant growth regulators (PGRs), the primary focus is on growth control mainly through regulating internode stretch. There are times when additional growth is needed; that's where a growth enhancement PGR, such as Fresco, should be considered.

Fresco is a combination of 1.8% gibberellins A4+A7 [GA<sub>4+7</sub>] and 1.8% benzyladenine [6-BA]. This combination provides stimulation of intermodal elongation with the GA<sub>4+7</sub> and enhancement of axillary shoot growth with the BA. When mixed together, the combination provides a controlled stimulation of enhanced plant growth.

The other labeled option for enhancing plant growth is Florigib 4L. It contains gibberellin A3 and only the lowest label rates should be trialed and used to avoid excessive stretch. By far, the majority of growers prefer to use Fresco because it enhances elongation and fullness of the plant, while providing a wider window of safety for avoiding overdose applications.

In addition, Fresco can be used to enhance bract development on poinsettias and aid in avoiding lower leaf yellowing on lilies.

With Fresco being an excellent tool in providing growth enhancement and improving postharvest quality, it's a handy addition to have in your PGR toolbox. In order to obtain the most effect from Fresco, below are some application tips to consider.

## Application tips

**Preventing lower leaf yellowing of lilies**—Fresco can be used to avoid lower leaf yellowing and necrosis when applied to lower leaves. It also delays flower senescence when applied to flower buds. Fresco can be used on Easter (*Lilium longiflorum*), LA Hybrid (*L. longiflorum*-*Asiatic* crosses) and oriental lilies, but use rates vary (see Fresco label for rates, timing and precautions before use). Fresco is used as a preventative application and doesn't correct leaf yellowing and flower senescence that's already occurred.

**Bract enhancement of poinsettias**—Fresco foliar sprays can be applied to poinsettias seven to 14 days before anthesis to increase bract size. Fresco may also be used at 3 ppm to promote bract expansion on plants treated with late season foliar applications of anti-GA PGRs (see Fresco label for rates, timing and precautions before use). Bract coloring on some red varieties may appear less intense immediately following a Fresco treatment. However, over time, the bracts should develop a more intense coloration. Use of Fresco may also result in an increase in plant height. Test on a few plants to determine the results. Bracts of white cultivars have been reported to develop a "whiter" appearance, with the use of a late-season application.

**Growth enhancement**—Fresco can be applied as a foliar spray, substrate drench or through chemigation. Typical recommended spray rates are in the range of 1 to 5 ppm. One should begin with the lowest rate, make the application and then wait seven days to determine if the desired level of growth enhancement is achieved. Re-application can be made if additional growth is desired. The goal is to apply only enough Fresco to promote sufficient growth or overcome the PGR effect or lack of growth. Too high of a rate will result in excessive stem or peduncle stretch and a light yellowing of the newly developing leaves. Growers have found that the 1 to 5 ppm range works in most cases, but growers have reported that the response rate can vary significantly by cultivar. So it's best to start

with a small trial to determine optimal rates.

Fresco is the only GA<sub>4+7</sub> and 6-BA product registered for drench applications. Drench applications have become increasingly popular because there's more even distribution of Fresco within the plant and less negative effect on leaf and flower growth.

## Fresco for Overcoming PGR Overdose



Figure 1. Growth enhancement with the use of Fresco foliar sprays on New Guinea impatiens after the plants were stilled with an overdose paclo application



Figure 2. Lower leaf yellowing and necrosis on lilies. An application will help avoid this situation, especially under low light conditions.

### Growth enhancement use tips—Foliar sprays

1. Initially begin with the lower end of the recommended range. The initial rate range for a foliar spray should be between 1 to 3 ppm. Avoid applying >10 ppm or excessive stretch may occur.
2. Complete coverage is required because Fresco applied to the leaves isn't easily transported throughout the plant.
3. Allow up to seven days to determine if plant growth is increased before making a second application. When reapplying, many growers will use half of the initial rate if the plants fail to take off.
4. When using Fresco for the first time, test it on a few plants to determine the results before applying it to your entire crop.
5. Excessive rates will result in undesirable stretch, often requiring an application of an anti-gibberellin plant growth regulator, such as Piccolo 10XC, to check the elongation.
6. Spray applications may cause bleaching of red bracts to a dusty pink coloration.
7. Follow the label recommendations, for it's the law.

### Growth enhancement use tips—Drenches

1. Initially begin with the lower end of the recommended range. The initial rate range for a drench should be between 1 to 3 ppm. Avoid applying >10 ppm or excessive stretch can occur.
2. Apply Fresco drenches with a sufficient volume of water to allow complete coverage of the root system. Make applications to moist, but not wet, substrates. Drench applications provide the benefit of more even uptake by the plant if a

sufficient volume of water is used. The volume of drench applied increases with the pot size. For example, typically 3 fl. oz. of drench solution is added to a 5-in. pot, 4 fl. oz. to a 6-in. pot and 10 fl. oz. to an 8-in. pot.

3. When applied as a drench through sub-irrigation, reduce rates normally used for top-of-the-pot applications by 25% to 50%.
4. Allow up to seven days to determine if plant growth is increased before making a second application. When reapplying, many growers will use half of the initial rate if the plants fail to take off.
5. Excessive rates will result in undesirable stretch, often requiring an application of an anti-gibberellin plant growth regulator, such as Piccolo 10XC, to check the elongation.
6. When using Fresco for the first time, test it on a few plants to determine the results before applying it to your entire crop.
7. Drench applications have been reported to be more effective than spray applications on poinsettias. Spray applications may cause bleaching of red bracts to a dusty pink coloration. If in doubt, test Fresco on a few plants to determine the results before applying it to your entire crop.
8. Drench applications will only work if the plant has adequate roots for Fresco uptake.
9. Follow the label recommendations, for it's the law.

**Timing.** In order to reap the benefits of a Fresco application, application timing is critical. Most applications are targeted at a specific stage of development and number of days in which it's effective or requiring sufficient time to realize results. Those specific timings are outlined on the Fresco label for each use.

**Avoid applications to stressed plants.** Enhanced plant quality will occur if Fresco is used correctly. Avoid applying Fresco to plants that are temperature, water, nutrient or pest stressed. Fresco foliar sprays are best applied in the morning or late afternoon/evening, when leaf drying time will be slower, which allows greater uptake by the plant.

**Optimal concentrations.** Recommended use rates vary from 1 to 3 ppm foliar sprays for enhancing plant growth, 3 ppm for bract expansion, to 10 to 100 ppm, respectively, for avoiding early and late lower leaf yellowing with lilies. Refer to each species listed on the Fresco for specific details. For foliar spray applications, apply 1 gal. of spray solution uniformly over 200 sq. ft. of bench area. Avoid applying more than 15 ml of spray solution per plant.

**Phytotoxicity.** Overdoses of Fresco can result in excessive stretch. Therefore, utilize the lower recommended rate range and test on a few plants to determine the suitability of the rate.

**Protective equipment and REI.** Applicators must wear a long-sleeved shirt and long pants, wear chemical-resistant gloves, protective eyewear, socks and shoes, and chemical-resistant apron when mixing, loading or cleaning equipment. The restricted entry interval (REI) is 4 hours. Ⓢ

# Wide Assortment of Available PGRs

By Brian E. Whipker, North Carolina State University & Joyce G. Latimer, Virginia Tech

## Here's an overview of PGRs now available for use on ornamental crops

The number of options available for controlling plant growth has greatly expanded over the past few years (Table 1). There are now options for controlling growth, expanding growth and encouraging branching. Each label has specific recommended dose ranges, recommendations and precautions (Table 2). Here is an overview of the PGRs now available for use on ornamental crops.

### Ancymidol

(Commercial names: **Abide** and **A-Rest**)

Ancymidol readily moves through the plant and is usually used on crops where other chemicals aren't effective (most notably in bulb crops) or on very high-value crops (i.e., plugs). Growers often prefer the use of ancymidol on plugs because of the lack of phytotoxicity and it's a "safer" PGR to apply (because its limited residual activity allows the plugs to grow out of the growth control effects after being transplanted).

### Chlormequat chloride

(Commercial names: **Citadel** and **Cycocel**)

For ornamental crops, it's most commonly used on poinsettias, geraniums, osteospermum and hibiscus. Foliar chlormequat chloride applications can result in a phytotoxic response (chlorosis), but the symptoms are acceptable because they're usually covered up with new leaf growth. In certain crops (i.e., poinsettias, geraniums and herbaceous perennials), a mixture of daminozide and chlormequat chloride (both may be used or applied at reduced rates) may be used. This usually provides for greater height control and reduces the potential for phytotoxicity. Substrate drenches are also effective, but not cost effective.

### Daminozide

(Commercial names: **Dazide** and **B-Nine**)

This material is applied only as a foliar spray because it's rapidly broken down when applied to the substrate. It's highly mobile in the plant and will rapidly move from the point of application to all parts of the plant. Daminozide is effective on most crops except lilies. It's highly effective in controlling growth of seedlings in plug flats and it's most effective in cooler climates.

### Dikegulac sodium

(Commercial name: **Atrimmec**)

Although Augeo, the greenhouse version of dikegulac sodium, is no longer on the market, Atrimmec has been available and registered for greenhouse and nursery use for a long time. Dikegulac sodium temporarily stops shoot elongation, thereby promoting lateral branching. Thus, it is a growth retardant and a pinching agent for ornamental crops, including azaleas, bougainvillea, clerodendron, fuchsia, grape ivy, geranium, lantana, lipstick vine, verbena and some of the herbaceous perennials. Be aware that Atrimmec typically causes greater phytotoxicity and distorted growth on herbaceous crops than Augeo did. So be cautious—especially at higher rates—and allow sufficient time for new plant growth to cover any damaged leaves. ▶

**Table 1. The wide assortment of plant growth regulators available for ornamental crops.**

CHEMICAL	PRODUCTS
Ancymidol	<b>Abide</b> , A-Rest
Chlormequat chloride	<b>Citadel</b> , Cycocel
Daminozide	<b>Dazide</b> , B-Nine
Dikegulac sodium	Atrimmec
Ethephon	<b>Collate</b> , Florel
Flurprimidol	Topflor
Paclobutrazol	<b>Piccolo</b> , <b>Piccolo 10 XC</b> , Bonzi, Paczol, Downsize (drenches only)
Uniconazole	<b>Concise</b> , Sumagic
Benzyladenine (BA)	<b>Configure</b>
Gibberellin (GA <sub>3</sub> )	<b>Florgib</b> , ProGibb T&O
BA+GA <sub>4</sub> +7	<b>Fresco</b> , Fascination

**Table 2. Comparing Attributes of Plant Growth Regulators**

ATTRIBUTES	PLANT GROWTH REGULATOR							
	Chemical	Ancymidol	Chlormequat chloride	Daminozide	Daminozide + Chlormequat chloride	Ethephon	Flurprimidol	Paclobutrazol
Trade name(s)	Abide, A-Rest	Citadel, Cycocel	Dazide, B-Nine	—	Collate, Florel	Topflor	Piccolo, Piccolo 10 XC, Bonzi, Downsize, Paczol	Concise, Sumagic
Active ingredient (%)	0.03%	11.80%	85%	—	21.7%/3.9%	0.38%	0.4% 4% (Piccolo 10 XC)	0.06%
<b>Activity level</b>	++	+	+	++	+	+++	+++	+++
<b>Multiple applications needed</b>	++	+++	+++	++	++	+	+	+
<b>Application type<sup>1</sup></b>								
Foliar spray	yes	yes	yes	yes	yes	yes	yes <sup>1</sup>	yes
Substrate drench	yes	yes	no	no	no	yes	yes	yes
Dips/Soaks	plugs/liners	plugs/liners	cuttings	—	—	bulbs, plugs/liners	bulbs, plugs/liners	bulbs, plugs/liners
<b>Chemical absorption</b>								
Ease of absorption	+++	+	+	+	++	+++	+++	+++
Time (hours)	0.5-1.0	4	18-24	18-24	12-16	0.5-1.0	0.5-1.0	0.5-1.0
Factors that improve absorption	high humidity, limited air movement, cloudy days, early morning or late afternoon applications							
Translocation within the plant	+++	+++	+++	+++	—	+	+	+
<b>Absorption sites</b>								
Leaves	+++	+++	+++	+++	+++	++	++	++
Stems	+	+	—	+	—	++	++	++
Roots	++	+	—	—	+	+++	+++	+++
<b>Typical concentrations</b>								
Foliar sprays (ppm or mg/L)	15-50	1,000-3,000	1,250-5,000	Daminozide: 750-5,000 + Chlormequat 750-1,500	250-1,000	1-80	1-200	0.5-50
Drench (mg active ingredient per pot)	0.15-4.0 (1.25 to 33.8 ppm)	177-355 (1,500 to 3,000 ppm)	—	—	—	0.01-2.0 (0.08 to 17 ppm)	0.01-8.0 (0.1 to 68 ppm)	0.01-1.0 (0.1 to 11 ppm)
<b>Other factors</b>								
Does pine bark substrates affect drenches?	++	—	—	—	—	++	++	++
Phytotoxicity potential	+	+++	+	+	++ (Do not apply to stressed plants)	+	+	+
Overdose potential	+	+	++	++	++	+++	+++	+++
Optimum water pH	5.5-6.5	3.0-7.0	5.0-9.0	—	below 5.0	—	4.0-9.0	5.5-6.5
<b>Shelf life</b>								
In the bottle (years)	<3	<2	<2	—	indefinite	<4	<4	<2
Mixed solution	within 24 hours	within 24 hours	within 24 hours	within 24 hours	within 4 hours	within 24 hours	within 1 week	within 24 hours

— = Not applicable.

Degree of activity: (+) least to (+++) greatest

<sup>1</sup> Check label for legal uses

## Resources

### Ethephon phosphonic acid

(Commercial names: **Collate** and **Florel**)

This material is absorbed by the plant tissue, and due to a change in pH once absorbed into the plant cells, releases ethylene. Collate and Florel are used to promote flower bud abortion and vegetative branching in crops. Collate and Florel are applied as a foliar spray at concentrations of 250 to 500 ppm. Although ethephon has soil activity, it's not labeled for use as a drench or liner soak application.

### Flurprimidol

(Commercial name: **Topflor**)

Flurprimidol is a relatively recent introduction into the U.S. market, although it's been available in Europe since the 1990s. Flurprimidol is chemically closely related to ancymidol, but it has a greater degree of activity. Flurprimidol is also one of the most cost-effective growth retardants to use as a drench, with recommended use rates in a range similar to uniconazole on most plants. Flurprimidol is also available in a granular formulation for containerized ornamentals.

### Paclobutrazol

(Commercial names: **Piccolo**, **Piccolo 10 XC**, **Bonzi**, **Downsize** [labeled for drench applications only] and **Paczol**)

Paclobutrazol is the most widely used growth retardant for greenhouse-grown floriculture crops in the U.S. It's commonly applied as a foliar spray or a substrate drench. It can be applied as a single high-dose drench to provide season-long control of growth or as a low-dose drench of 0.1 to 1 ppm to provide temporary control of plant growth.

### Uniconazole

(Commercial names: **Concise** and **Sumagic**)

Uniconazole is applied as a foliar spray, as a substrate drench or as a liner soak. As a drench, uniconazole is applied at rates 50% lower than those recommended for paclobutrazol. This chemical is commonly used on perennials because it's highly effective on a very broad range of plant species.

### Cautions

Both paclobutrazol and uniconazole are triazole-type chemicals. Ancymidol and flurprimidol are in a different chemical class, but have similar characteristics. These chemicals don't readily move within the plant since they're transported in the xylem and not in the phloem. Therefore, these four chemicals are absorbed by the leaves, but aren't readily transported out of the leaves to other parts of the plant. Thus, foliar sprays are applied with sufficient volume of water (2 qt. per 100 sq. ft.) to have some stem and soil activity.

The activity of flurprimidol, paclobutrazol and uniconazole are long lasting and at very low rates, thus the potential for error and crop overdose is greater than with other PGRs. Also note, ancymidol, flurprimidol, paclobutrazol and uniconazole are persistent on plastic surfaces and in soil. Do not reuse flats, pots or soil from treated plants, especially for plug production of sensitive crops.

## Other Growth Regulators

Not all plant growth regulators are used to control plant height. Others are used to cause flower bud abscission, increase branching, promote flowering and stimulate shoot elongation.

### Benzyladenine

(Commercial name: **Configure**)

Benzyladenine (BA) is used to promote branching and increase flower set. Configure has specific label recommendations for Christmas cactus, echinacea and hostas, as well as use directions for experimental applications on any annual, perennial, foliage or tropical plant grown in a greenhouse. Optimal results occur when the plant is actively growing and is physiologically receptive for growth or flower promotion. Configure has been very effective in improving branching of many herbaceous perennial crops, as both liners and finished plants. Benzyladenine doesn't readily move within the plant, therefore, complete coverage is required.

### Gibberellins

(Commercial names: **Florgib** and **ProGibb T&O**)

Gibberellins can be applied to promote growth and overcome an over-application of gibberellin-inhibiting plant growth retardants. They're also used to promote stem elongation for tree forms of plants.

### Benzyladenine + Gibberellin Combinations

(Commercial names: **Fresco** and **Fascination**)

These combination products are used on potted lilies as foliar sprays to avoid lower leaf yellowing and leaf drop, plus prolonging flower life. They're also used to overcome the effects of an over-application of gibberellin-inhibiting plant growth retardants. 





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# Growth Regulators for Containerized Herbaceous Perennial Plants

By Joyce G. Latimer, Virginia Tech

This table lists label rates, when available, and includes recommendations based on research from Virginia Tech and other published sources, as well as from plant suppliers and growers. Spray rates listed are recommended as applications at the label-recommended volume of 1 gal. per 200 sq. ft. unless otherwise stated. Use the rates listed as starting points for your own PGR trials.

Note: Not all uses are listed on the label; always check the product label before using. Consult product labels for a complete listing of precautions and recommended use rates. When using any PGR for the first time, always test the rate on a few plants and compare the results to untreated plants before treating an entire crop. Keep in mind that Sunbelt growers use higher rates than Northern growers.

**Please note:** Recommendations are color-coded according to source. Those in yellow are from Sunbelt sources; blue are from northern sources; green are from sources that do not specify area of the country, including product labels, many producer websites and cultural guides; and pink are recommendations related to increasing plant branching. For research results identified as “Fine Configure Guide,” see details and the original references in the Configure Product Information and University Trial Results (information on how to get it at the end of the table).

**For product mixing instructions, see the PGR Dilution Table on page 67.**

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Achillea millefolium</i> (Common Yarrow)	To control plant growth	Abide/A-Rest	Greater than 1.5 mg a.i. drench x 1	Moderate control of Summer Pastels; Test higher drench rates (3.3 fl. oz./pot); Drench volume and mg a.i. vary with pot size ( <i>Tenn. Tech. Univ.</i> )	South
			1 to 2 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>SePro Specific Species and Application Rates</i> )	Unspecified
			50 to 100 ppm spray x 1	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
		Collate/Florel	500 or 1,000 ppm spray x 1 to 3	Higher rates or more frequent treatment gave moderate growth control; All treatments increased number of inflorescences with slight delay in flowering ( <i>Michigan State Univ.</i> )	North
		Dazide/B-Nine	5,000 ppm spray x 2	Good control of Red Beauty and Paprika with 2 applications 2 weeks apart, but Moonshine was not responsive at 5,000 ppm x 2 ( <i>Univ. Georgia, Virginia Tech</i> )	South
			7,650 ppm spray x 1	Good control of Coronation Gold with a single application applied 2 weeks after removal from vernalization cooler ( <i>Auburn Univ.</i> )	South
			2,500 ppm spray x 2 to 3	Tutti Frutti responsive to 2,500 ppm daminozide applied at weekly intervals until desired control is established ( <i>Pilon, GPN 2007</i> )	North
			Tank mix	Tutti Frutti responsive to tank mix of 2,000 ppm daminozide and 3 ppm uniconazole applied at weekly intervals until desired control is established ( <i>Pilon, GPN 2007</i> )	
2,500 to 5,000 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North			

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1	Good control on Paprika ( <i>Univ. Georgia</i> )	South
			3,000 + 1,500 ppm spray x 4	Good control on Summer Pastels with 4 applications at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			5,000 + 1,500 ppm spray x 1	Label rate for Paprika ( <i>Cycocel</i> )	Unspecified
		<b>Citadel</b> /Cycocel	Not responsive at 5,000 ppm spray x 1	Coronation Gold not responsive ( <i>Univ. Georgia</i> )	South
			1,500 ppm spray x 4	Good control on Summer Pastels with 4 applications at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	96 to 120 ppm spray x 1	Moderate control of height of Coronation Gold with a single application of 96 ppm applied 2 weeks after removal from vernalization cooler ( <i>Auburn Univ.</i> ); Good control on Summer Pastels with 120 ppm spray ( <i>Virginia Tech</i> )	South
			60 ppm spray x 4	Excellent control of Summer Pastels with 4 applications at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			1.0 mg a.i. drench x 1	Good control on Summer Pastels with a 1.0 mg a.i. drench (3.3 fl. oz./pot); Drench volume and mg a.i. vary with pot size ( <i>Tenn. Tech. Univ.</i> )	South
		<b>Concise</b> /Sumagic	10 to 15 ppm spray x 1	Excellent response with Paprika and Coronation Gold, however, Red Beauty and Moonshine were not responsive at 60 ppm spray x 1 ( <i>Univ. Georgia and Virginia Tech</i> )	South
			30 ppm spray x 1	Moderate control of height of Coronation Gold with a single application applied 2 weeks after removal from vernalization cooler ( <i>Auburn Univ.</i> )	
			0.25 mg a.i. drench x 1	Moderate control of Summer Pastels; Higher drench rates significantly reduced number of flowers (3.3 fl. oz./pot); Drench volume and mg a.i. vary with pot size ( <i>Tenn. Tech. Univ.</i> )	
			7 to 15 ppm spray x 1 to 4	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ). Excellent control of Summer Pastels with 4 applications of 15 ppm sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		Topflor	150 ppm spray x 1	Moderate control of height of Coronation Gold with one application; Multiple applications may be required; Tested under nursery conditions ( <i>Auburn Univ.</i> )	South
		To increase lateral or basal branching	<b>Configure</b>	600 ppm spray x 2	60% increase in branching when applied to Moonshine as liner (21 days after sticking) and again at 5 days after transplanting; No phytotoxicity ( <i>Virginia Tech</i> )
	<b>Agastache hybrids</b> (Anise Hyssop)	To control plant growth	<b>Collate</b> /Florel	500 ppm spray x 4	Excessive height control of Blue Fortune, but no delay in flowering with 4 applications at 2-week intervals ( <i>Michigan State Univ.</i> )
<b>Dazide</b> /B-Nine			5,000 ppm spray x 2 to 3	Based on research results with Blue Fortune ( <i>Univ. Georgia, Virginia Tech</i> )	South
			1,200 to 1,500 ppm spray x 1 to 3	For all hybrids ( <i>Pacific Plug &amp; Liner Production Info</i> )	North
			2,500 to 5,000 ppm spray x 2 to 3	Weekly applications as necessary ( <i>Pilon 2012</i> )	
<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix			5,000 + 1,500 ppm spray x 1	Based on research results with Blue Fortune ( <i>Univ. Georgia</i> )	South
			2,500 + 1,000 ppm spray to 5,000 + 1,500 ppm spray x 2 to 3	Weekly applications as necessary ( <i>Pilon 2012</i> )	North

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Agastache hybrids</b> (Anise Hyssop) <i>continued</i>	To control plant growth <i>continued</i>	<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	1 to 2 ppm drench x 1	Drench volume and mg a.i. vary with container size ( <i>Pacific Plug &amp; Liner Production Info</i> )	North
			30 to 60 ppm spray x 1	Good control ( <i>Pilon 2012</i> )	North
		<b>Concise/Sumagic</b>	80 to 160 ppm spray x 1 less than 5 ppm drench x 1	Good control of Tutti Frutti with 80 ppm spray, but excessive growth reduction with 5 ppm drench at 2 fl.oz. per quart pot Higher spray rate required for Purple Haze; Multiple applications may be required. An 8 ppm drench at 10 fl.oz. per trade gallon pot gave excellent control of Purple Haze; Drench volume and mg a.i. vary with container size ( <i>Virginia Tech</i> )	South
			10 to 30 ppm spray x 1 2 ppm drench x 1	Cultivar variation, use lower rates with Blue Fortune, which is very sensitive to uniconazole ( <i>Univ. Georgia</i> ); 30 ppm immediately after transplant caused excessive growth regulation of Blue Boa; Higher rate and drench with Purple Haze; Drench at 10 fl. oz. per trade gallon pot; Drench volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South
			1 ppm liner soak x 1 or 1 ppm liner drench x 1	Excessive growth control of Blue Boa after liner soak or drench (0.3 fl. oz. per 72-size cell) just prior to transplanting; reduce rate ( <i>Virginia Tech</i> )	South
			5 to 10 ppm spray x 1	Good control ( <i>Pilon 2012</i> )	North
	To enhance lateral branching	<b>Configure</b>	300 to 500 ppm spray x 1 on liners	Purple Haze treated with 300 ppm approximately 4 days after liners were removed from mist increased lateral branching; Multiple applications during liner production or higher rates decreased root growth. Treatment of Tutti Frutti with 500 ppm spray the day after removal from mist increased branching of liners (3 weeks after treatment) and finished plants (8 weeks after treatment) ( <i>Virginia Tech</i> )	Branching
<b>Ajuga reptans</b> (Bugleweed)	To control plant growth	<b>Concise/Sumagic</b>	2.5 ppm spray x 1	Not generally required ( <i>Pilon 2006</i> ); Use caution in applying PGRs as plants can be very sensitive ( <i>Walters Gardens Culture Sheets</i> )	North
<b>Alcea hybrids</b> (Hollyhock)	To control plant growth	<b>Abide/A-Rest</b>	100 ppm spray x 6	Good height control of Chaters Doubles with 6 weekly sprays ( <i>Michigan State Univ.</i> )	North
		<b>Citadel/Cycocel</b>	500 ppm spray x 3+	For Alcea Spring Celebrities Series, apply at least once a week after true leaf appears with no more than 3 applications through plug life. For finishing, spray as needed until buds appear. Stop PGR applications when bud emergence is detected to prevent deformation of flowers ( <i>American Takii</i> )	Unspecified
		<b>Dazide/B-Nine</b>	5,000 ppm spray x 6	Good height control of Chaters Doubles with 6 weekly sprays ( <i>Michigan State Univ.</i> )	North
			2,500 ppm spray x 3+	For Alcea Spring Celebrities Series, apply at least once a week after true leaf appears with no more than 3 applications through plug life. For finishing, spray as needed until buds appear. Stop PGR applications when bud emergence is detected to prevent deformation of flowers ( <i>American Takii</i> )	Unspecified
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	15 ppm spray x 1 early in crop or 3 to 6 ppm drench x 1 late in crop	Early spray treatment effective; Drench to counter rapid elongation that occurs as the plants approach flowering ( <i>Pilon 2012</i> )	North
			0.5 ppm drench x 1	For Alcea Spring Celebrities Series, light drench when initial flower spike has extended to 6-8 inches will keep plant more compact for shipping ( <i>American Takii</i> )	Unspecified
		<b>Concise/Sumagic</b>	2.5 ppm spray x 1 early in crop	Early treatment effective ( <i>Pilon 2012</i> )	North

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b><i>Alchemilla mollis</i></b> (Lady's Mantle)	To control plant growth	<b>Dazide</b> /B-Nine	Not responsive at 5,000 ppm spray x 2	Not responsive ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1	Multiple applications at 10- to 14-day intervals may be necessary ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/ Paczol/Downsize (drenches only)	Not responsive at 200 ppm spray x 1	Not responsive ( <i>Virginia Tech</i> )	South
			30 ppm spray x 1 to 3 6 ppm drench x 1	Multiple applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified
		<b>Concise</b> /Sumagic	Not responsive at 90 ppm spray x 1	Not responsive ( <i>Virginia Tech</i> )	South
<b>Amsonia</b> (Blue Star)	To control plant growth	<b>Concise</b> /Sumagic	5 ppm spray x 1 1 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Walters Gardens Culture Sheet</i> )	North
<b>Aeonium hybrid</b> (succulents)	Increase offsets	<b>Configure</b>	Not responsive at 50 to 400 ppm spray x 1	Single foliar spray applied 2 weeks after potting ( <i>Fine Configure Guide</i> )	Branching
<b>Agave hybrid</b> ( <i>A. guiengola</i> <i>A. gemniflora</i> )	Increase offsets	<b>Configure</b>	Not responsive at 100 to 800 ppm spray x 2	Two foliar sprays applied 1 month apart, starting 6 weeks after potting ( <i>Fine Configure Guide</i> )	Branching
<b>Alpinia</b> (Red Ginger)	Induce lateral or basal branching	<b>Configure</b>	Not responsive at 100 ppm soak x 1	Foliar soak of rooted plants ( <i>Fine Configure Guide</i> )	Branching
<b><i>Aquilegia x hybrida</i></b> (Hybrid Columbine)	To control plant growth, apply as flower stalks get above foliage ( <i>Pilon 2006</i> )	<b>Abide</b> /A-Rest	25 ppm spray x 2 to 3	Apply weekly sprays ( <i>Pilon 2006</i> )	North
			25 to 50 ppm spray x 1	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			65 to 132 ppm spray x 1; 2 to 4 ppm drench x 1	Apply when plants are well-rooted with 5 to 8 leaves; Also for Star series, recommends tank mix 10 ppm ancymidol + 1,875 ppm daminozide as needed ( <i>SePro Specific Species and Application Rates</i> )	Unspecified
			Tank Mix	Apply a tank mix of 10 ppm ancymidol + 2,000 ppm daminozide as 2 to 3 weekly sprays ( <i>Pilon 2006</i> ); Star series, tank mix 10 ppm ancymidol + 1,875 ppm daminozide as needed ( <i>SePro Specific Species and Application Rates</i> )	North
		<b>Collate</b> /Florel	Not responsive at 750 ppm sprays x 5	Pink & White height and flowering not responsive to 5 weekly sprays ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Effective on McKana Giants ( <i>Univ. Georgia</i> )	South
			5,000 ppm spray x 4 to 5	Excellent control of Music Pink & White with 4 applications at 2-week intervals and of Origami Blue & White and Pink & White with 5 weekly applications ( <i>Michigan State Univ.</i> )	North
			Tank Mix	Songbird F1, Swan F1 Series, apply a tank mix of 2,000 ppm daminozide and 10 ppm ancymidol as needed ( <i>PanAmerican Seed, 2018</i> ); Make 2 to 3 weekly applications of a tank mix of 3 ppm uniconazole + 2,000 ppm daminozide sprays ( <i>Pilon 2006</i> )	North
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	2,500 ppm + 1,000 ppm spray x 2 to 3	Apply as flower stalks get above foliage; 2 to 3 weekly applications ( <i>Pilon 2006</i> )	North
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/ Paczol/Downsize (drenches only)	Not responsive at 240 ppm spray x 1	McKana Giants was not responsive to a single spray application of 240 ppm ( <i>Univ. Georgia</i> )	South
			30 ppm spray x 2 to 3	Apply weekly applications ( <i>Pilon 2006</i> ); However, Origami Blue & White and Pink & White were not responsive at 90 ppm sprays x 5 weekly applications ( <i>Michigan State Univ.</i> )	North
			30 ppm spray x 1 to 3 6 ppm drench x 1	Multiple applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Aquilegia x hybrida</b> (Hybrid Columbine) <i>continued</i>	To control plant growth, apply as flower stalks get above foliage ( <i>Pilon 2006</i> ) <i>continued</i>	<b>Concise/Sumagic</b>	Not responsive at 120 ppm spray x 1	McKana Giants was not responsive to a single spray application of 120 ppm ( <i>Univ. Georgia</i> )	South
			5 to 15 ppm spray x 2 to 4	Apply 5 ppm sprays 2 to 3 weekly applications ( <i>Pilon 2006</i> ); Good control with 15 ppm sprays applied 4 to 5 times on Music Pink & White and Origami Blue & White ( <i>Michigan State Univ.</i> )	North
<b>Aquilegia fiabellate</b> (Columbine)	Induce lateral or basal branching	<b>Configure</b>	Not responsive at 50 to 1,600 ppm spray x 1	No effect of single foliar spray applied 2 weeks after potting ( <i>NC State Univ.</i> )	Branching
<b>Aquilegia vulgaris</b> (Columbine)	To control plant growth	<b>Dazide/B-Nine</b>	1,500 to 2,500 ppm spray x 1	Clementine, Winky Double and Winky Single Series; multiple applications may be necessary ( <i>PanAmerican Seed, 2018</i> )	Unspecified
	Induce lateral or basal branching	<b>Configure</b>	Not responsive at 600 ppm spray x 1	No effect with our screening rate on Winky Purple White; Test multiple applications or higher rates ( <i>Virginia Tech</i> )	Branching
<b>Arenaria montana</b> (Sandwort)	To control plant growth	<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	5 ppm spray x 1 applied to liners	Liners of Avalanche were responsive ( <i>Univ. Calif.</i> )	South
<b>Artemisia arborescens</b> (Powis Castle)	To control plant growth	<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	5 to 40 ppm spray x 1	Responsive to 5 to 40 ppm paclobutrazol sprays ( <i>Ball Hort</i> )	Unspecified
<b>Artemisia schmidtiana</b> (Wormwood, White Sage)	To control plant growth	<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	Moderate control of Silver Mound with multiple applications ( <i>Virginia Tech</i> )	South
			<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Moderate control of Silver Mound; Multiple applications may be required ( <i>Virginia Tech</i> )
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)</b>	200 ppm spray x 1	Moderate control of Silver Mound with 200 ppm sprays; May require multiple applications ( <i>Virginia Tech</i> )	South
			40 to 50 ppm spray	Responsive to 40 to 50 ppm paclobutrazol sprays ( <i>Ball Hort</i> )	Unspecified
			6+ ppm drench x 1	Responsive to a single 6+ ppm drench; Volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
			50 ppm spray x 1	Silver Mound in 1-gal. containers ( <i>Univ. Calif.</i> )	South
		<b>Concise/Sumagic</b>	30 to 60 ppm spray x 1	Moderate control of Silver Mound with 45 ppm spray, but the hybrid Oriental Limelight was more sensitive; use 30 ppm sprays; And the hybrid Powis Castle was less responsive; test 60 ppm sprays; Multiple applications may be necessary ( <i>Virginia Tech</i> )	South
<b>Aruncus hybrid</b> (Goat's beard)	To control plant growth	<b>Concise/Sumagic</b>	5 ppm spray x 1	Apply 3 to 4 weeks after transplanting. Multiple applications may be needed at 7 to 10 day intervals ( <i>Walters Gardens Culture Sheets</i> )	North
<b>Asclepias tuberosa</b> (Butterfly Weed)	To control plant growth	<b>Abide/A-Rest</b>	25 to 50 ppm spray x 1 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			26 ppm spray x 1	Drench volume and mg a.i. vary with pot size ( <i>SePro Specific Species and Application Rates</i> )	Unspecified
			2 ppm drench x 1		
		<b>Dazide/B-Nine</b>	Not responsive at 5,000 ppm spray x 3	Not responsive ( <i>Univ. Georgia</i> )	South
			3,750 to 5,000 ppm spray	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	Not responsive at 5,000 + 1,500 ppm spray x 1	Not responsive ( <i>Univ. Georgia</i> )
		2,500 + 1,500 ppm spray x 1	Label rate for Royal Red ( <i>Cycocel</i> )	Unspecified	

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION		
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	Not responsive at 50 ppm spray x 1	No effect on plant height, but reduced width of Hello Yellow 10% to 18%; Drenches applied at 2 fl. oz. per quart pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South		
			Not responsive at 2 ppm drench x 1				
			10 to 20 ppm spray x 1 to 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North		
			30 to 60 ppm spray x 1	Label rate	Unspecified		
		<b>Concise</b> /Sumagic	45 ppm spray x 1	Good control ( <i>Univ. Georgia</i> )	South		
5 to 10 ppm spray x 1	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )		North				
	To induce lateral branching	<b>Configure</b>	Not responsive at 600 ppm spray x 1	No effect with our screening rate; Higher rates or multiple applications may be effective ( <i>Virginia Tech</i> )	Branching		
<b>Aster dumosus</b> (Bushy Aster)  <b>Aster x frikartii</b> (Frikart's Aster)  <b>Aster novae-angliae</b> (New England Aster)	To control plant growth	<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Apply first application after pinching when new shoots are approximately 1-in. long; Aster x frikartii cvs. Monarch and Monch were responsive to 2-spray application of daminozide, but A. dumosus Sapphire was not responsive to this rate ( <i>Virginia Tech</i> )	South		
			2,500 to 4,000 ppm spray x 1 to 3	Apply first application after pinching when new shoots are approximately 1-in. long; 2,500 ppm spray is a starting test point; Rates vary depending on variety vigor, temperature and growth stage of the crop; Do not apply daminozide after buds reach pea size to avoid flower discoloration and delay; A. novae-angliae Purple Dome is responsive to 2,500 to 4,000 ppm sprays ( <i>Ball Hort</i> )	Unspecified		
			2,500 ppm spray x 2	Good control ( <i>Pilon 2006</i> )	North		
			Tank mix	Tank mix of 2,000 ppm daminozide + 3 ppm uniconazole sprays x 1 to 2 ( <i>Pilon 2006</i> )			
			<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	Not responsive at 5,000 + 1,500 ppm spray x 1	A. dumosus Sapphire was not responsive to this rate ( <i>Virginia Tech</i> )	South	
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	80 ppm spray x 1	80 ppm spray controlled width of A. dumosus Sapphire, but had little effect on height; A. x frikartii Monarch and Monch were not responsive to one spray application of 240 ppm, but were responsive to a drench application; Drench applied at 2 fl. oz. per quart pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech, Univ. of Georgia</i> )	South		
			2 to 16 ppm drench x 1				
			30 ppm spray x 1 to 2	1 or 2 spray applications 7 to 10 days apart; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North		
			6+ ppm drench x 1				
			30 to 50 ppm sprays	Some growers use a paclobutrazol drench to hold their crop at a given height; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Culture Sheets</i> )	Unspecified		
		2 ppm drench x 1					
		<b>Concise</b> /Sumagic	30 ppm spray x 1	Moderate width control of A. dumosus Sapphire, but little effect on height; A. x frikartii Alpine Mix, Monarch and Monch were not responsive to one spray application of 60 ppm or a drench of 4 ppm; Drench applied at 2 fl. oz. per quart pot; volume and mg a.i. vary with pot size ( <i>Virginia Tech, Univ. Georgia</i> )	South		
			2.5 to 10 ppm spray x 1	Uniconazole is also very effective, but results have been quite variable; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Culture Sheet</i> )	Unspecified		
			0.1 to 1.0 ppm drench x 1				
			10 to 50 ppm spray x 1	A. dumosus Purple Dome is responsive to uniconazole ( <i>Ball Hort</i> )			
		Topflor	Not responsive at 60 ppm spray x 1	No response in fall trial with A. dumosus Sapphire ( <i>Virginia Tech</i> )	South		
			To induce lateral branching	<b>Configure</b>	Phytotoxic at 600 ppm spray x 1	Significant phytotoxic response at a single spray of 600 ppm applied to liners or transplanted plants ( <i>Virginia Tech</i> )	Branching

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Astilbe x arendsii</i> (False Spirea)	To control plant growth	<b>Abide/A-Rest</b>	100 ppm spray x 6	Weekly applications resulted in good control of <i>A. thunbergii</i> Ostrich Plume, but 4 applications at 2-week intervals gave no control of <i>A. arendsii</i> Granat ( <i>Michigan State Univ.</i> )	North
<i>Astilbe chinensis</i> (Chinese Astilbe)		<b>Collate/Florel</b>	500 ppm spray x 4	Excessive growth regulation of Granat with 4 sprays at 2-week intervals; Did not delay flowering ( <i>Michigan State Univ.</i> )	North
<i>Astilbe thunbergii</i> (False Spirea)		<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	To control plant height on taller cultivars, apply 2 applications of daminozide as a foliar spray 1 week apart beginning soon after inflorescences begin to elongate; Michigan State Univ. studies have shown that the timing of the application is critical; Growth regulators were ineffective at limiting plant height when they were applied prior to inflorescence elongation ( <i>Walters Gardens Culture Sheets</i> )	North
			Less than 5,000 ppm spray x 2	Excessive height reduction of <i>A. chinensis</i> Purpurkerze; Use lower rate and/or fewer applications; However, <i>A. x arendsii</i> Elizabeth Bloom was not responsive to these rates ( <i>Virginia Tech</i> )	South
			5,000 ppm spray x 6	Weekly applications resulted in good control of <i>A. thunbergii</i> Ostrich Plume, but 4 applications at 2-week intervals gave no control of <i>A. arendsii</i> Granat ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	Less than 5,000 + 1,500 ppm spray x 1	Excessive height reduction of <i>A. chinensis</i> Purpurkerze; Reduce both daminozide and chlormequat rates ( <i>Virginia Tech</i> )	South
			1,500 ppm spray x 1	Moderate control of <i>A. chinensis</i> Purpurkerze ( <i>Virginia Tech</i> )	South
		<b>Citadel/Cycocel</b>	1,500 ppm spray x 6	Weekly applications resulted in good control of <i>A. thunbergii</i> Ostrich Plume but 4 applications at 2-week intervals gave no control of <i>A. arendsii</i> Granat ( <i>Michigan State Univ.</i> )	North
			750 to 1,000 ppm spray x 1 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	
			40 to 80 ppm spray x 1 to 2	40 ppm x 1 resulted in good control of <i>A. chinensis</i> Purpurkerze; However, 80 ppm x 1 resulted in only short term height control of <i>A. x arendsii</i> Elizabeth Bloom; Plan on multiple applications ( <i>Virginia Tech</i> )	
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)</b>	30 ppm spray x 2	Treat after inflorescences begin to elongate, apply sprays 7 days apart; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
			6+ ppm drench x 1	Weekly applications resulted in good control of <i>A. thunbergii</i> Ostrich Plume, but 4 applications at 2-week intervals gave no control of <i>A. arendsii</i> Granat ( <i>Michigan State Univ.</i> )	
			90 ppm spray x 6	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	
			15 to 30 ppm spray x 1 to 2	Good control of <i>A. chinensis</i> Purpurkerze; Short-term response on <i>A. x arendsii</i> Elizabeth Bloom; Plan on multiple applications ( <i>Virginia Tech</i> )	
		<b>Concise/Sumagic</b>	25 to 35 ppm spray x 1 to 2	Weekly applications resulted in excellent control of <i>A. thunbergii</i> Ostrich Plume, but 4 applications at 2-week intervals resulted in excessive height reduction of <i>A. arendsii</i> Granat ( <i>Michigan State Univ.</i> )	North
			15 ppm spray x 6	Apply to <i>A. arendsii</i> 2 to 3 weeks after transplant; Multiple applications at 7- to 10-day intervals as necessary ( <i>Pilon, Sumagic Advisor 2006</i> ) Apply when flower stems begin to appear above foliage ( <i>Walters Gardens Culture Sheet</i> )	
			5 ppm spray x 2 to 3		

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Baptisia australis and Baptisia hybrids</b>	To control plant growth	<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	6 to 10 ppm drench x 1	Apply at 6-in. height for good control of Baptisia hybrids ( <i>Grower Recommendation</i> )	North
			45 to 60 ppm spray x 2 to 3 or 12 to 18 ppm drench x 1	Drench is more effective than sprays ( <i>Pilon 2012</i> ); Decadence apply 15 ppm drench when plant is 6 inches tall; Drench volume and mg a.i. will vary with pot size ( <i>Proven Winners 2017 Perennial-Shrub Culture Guide</i> )	North
		<b>Concise</b> /Sumagic	1 ppm drench x 1 at 6 inches in height	American Goldfinch or Pink Lemonade, follow drench with 5 ppm sprays for additional control as needed; Drench volume and mg a.i. will vary with pot size ( <i>Walters Gardens Culture Sheet</i> )	North
			Not responsive to 60 ppm spray x 1 or to 1.5 ppm drench x 1	Test higher rates or multiple spray applications; Drench volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	South
<b>Boronia heterophylla</b> (Red Boronia)	Induce lateral or basal branching	<b>Configure</b>	100 ppm foliar spray x 6 on mature plants 50 ppm foliar spray x 4 on rooted cuttings	Mature plants in mid-fall – foliar spray every 3 days for 18 days vastly increased branching over pinching. Transient phytotoxicity noted. Rooted cuttings in mid-fall - foliar spray every 2 days for 4 to 8 day. Higher rates and more applications caused phytotoxicity and reduced flowering ( <i>Fine Configure Guide</i> )	Branching
<b>Boronia metastigma</b> (Brown Boronia)	Induce lateral branching and additional cuttings	<b>Configure</b>	100 ppm foliar spray x 3	Weekly sprays starting 2 months prior to taking cuttings increased branching but subsequent cuttings rooted very poorly compared to control ( <i>Fine Configure Guide</i> )	Branching
<b>Buddleia davidii</b> (Butterfly Bush)	To control plant growth	<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Moderate control of Royal Red; Apply at 10- to 14-day intervals ( <i>Univ. Georgia</i> ); This rate resulted in no control of Pink Delight ( <i>Virginia Tech</i> )	South
			Not responsive at 5,000 + 1,500 ppm spray x 1	No height control of Royal Red or Pink Delight ( <i>Univ. Georgia, Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	Not responsive at 160 ppm spray x 1	No height control of Royal Red in Virginia Tech trials; Drench applied at 10 fl. oz. per trade gal. pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South
			Not responsive at 10 ppm drench x 1		
			10 mg a.i. drench x 1	Excellent control of Dubonnet under nursery conditions with drench (3.3 fl. oz./2.8-L pot); Drench volume and mg a.i. vary with pot size ( <i>Univ. Georgia</i> )	
			6 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
		<b>Concise</b> /Sumagic	60 ppm spray x 1	Moderate control of Royal Red; Multiple applications may be required; Drench applied at 10 fl. oz. per trade gal. pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South
			0.025 ppm drench x 1		
			20 ppm spray x 2	Moderate height control of Pink Delight with 2 applications 7 days apart; Additional applications may be necessary ( <i>Louisiana State Univ.</i> )	
			5 ppm spray x 1 to 2	Begin PGR applications about 2 weeks following the pinch and reapply at 7 to 10 day intervals if additional control is necessary ( <i>Walters Gardens Culture Sheet</i> )	North
	15 to 30 ppm spray x 1	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )			
Topflor	125 ppm spray x 1	Good control of growth of Royal Red with no delay in flowering ( <i>Auburn Univ.</i> )	South		
<b>Buddleia fallowiana Lochinch</b> (Butterfly Bush)	To control plant growth	<b>Concise</b> /Sumagic	60 ppm spray x 1 1.5 ppm drench x 1	Short-term height control with sprays and drenches; Multiple applications required; Drench applied at 10 fl. oz. per trade gal. pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South
<b>Buddleia weyeriana Honeycomb</b> (Butterfly Bush)	To control plant growth	<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	4 ppm liner soak x 1	Good control ( <i>Virginia Tech</i> )	South
		<b>Concise</b> /Sumagic	2 ppm liner soak x 1	Moderate control ( <i>Virginia Tech</i> )	South

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Caladium bicolor</i>	To control plant growth	Dazide/B-Nine	2,500 ppm spray x 6 to 8	As needed at 5- to 7-day intervals ( <i>Pilon 2012</i> )	North
		Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)	8 ppm drench x 1	Drench when shoots have emerged but before leaves unfold (approximately 2 to 3 weeks after potting) or apply foliar spray near end of crop cycle to improve shelf life ( <i>Pilon 2012</i> )	North
			30 ppm spray x 1		
<i>Calamagrostis x acutifolia</i> Karl Foerster (Feather Reed Grass)	To control plant growth	Dazide/B-Nine	Not responsive at 5,000 ppm spray x 2	( <i>Virginia Tech</i> )	South
		Dazide/B-Nine + Citadel/Cycocel Tank Mix	5,000+1,500 ppm spray x 2	Good height control with Karl Foerster ( <i>Virginia Tech</i> )	South
		Piccolo/Piccolo 10 XC/Bonzi/Paczol	Not responsive to 160 ppm spray x 1	( <i>Virginia Tech</i> )	South
			Concise/Sumagic	Not responsive to 60 ppm spray x 1	( <i>Virginia Tech</i> )
		1 ppm liner soak x 1		Good height control with a 2-minute liner soak ( <i>Virginia Tech</i> )	
		Topflor	Not responsive to 120 ppm spray x 1	( <i>Virginia Tech</i> )	South
<i>Campanula carpatica</i> (Carpathian Bellflower)  <i>Campanula glomerata</i> (Clustered Bellflower)  <i>Campanula persicifolia</i> (Peach-leaved Bellflower)	To control plant growth <i>C. carpatica</i> cultivars usually do not require PGRs, but are responsive to most of them. Under low-light conditions or for toning and shaping, one application is usually sufficient. If necessary, make a second application 7 to 10 days after the first ( <i>Pilon 2006</i> )	Abide/A-Rest	25 to 50 ppm spray x 1	One application at 25 ppm is usually sufficient; If necessary, make a second application 7 to 10 days after the first ( <i>Pilon 2006</i> )  <i>C. carpatica</i> or <i>C. persicifolia</i> may require 50 ppm sprays, especially later in the spring; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			100 ppm spray x 6	<i>C. glomerata</i> : Very good control on Kent Belle and Birch Hybrid with weekly applications; However, this treatment was not effective on Superba and caused excessive growth reduction of Cherry Bells ( <i>Michigan State Univ.</i> )	
		Collate/Florel	500 ppm spray x 4	Good growth control of <i>C. glomerata</i> Superba with 4 sprays at 2-week intervals; No delay in flowering. All sprays phytotoxic to <i>Campanula</i> Kent Belle; Did not reduce flower buds; Reduced growth ( <i>Michigan State Univ.</i> )	North
		Dazide/B-Nine	2,500 to 3,750 ppm spray x 2	<i>C. carpatica</i> may require 2,500 ppm for control under low-light conditions ( <i>Pilon 2006</i> )  <i>C. carpatica</i> or <i>C. persicifolia</i> may require 3,750 ppm sprays, especially later in the spring; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			2,500 ppm spray x 1 to 2	Multiple applications 7 days apart, can be effective at reducing plant height when applied just as the flower stems are beginning to elongate ( <i>Walters Gardens Culture Sheet</i> )	
		Citadel/Cycocel	750 ppm spray x 1	<i>C. carpatica</i> ( <i>Pilon 2006</i> ); Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			Less than 1,500 ppm spray x 3	Label rate <i>C. carpatica</i> ; Excessive height reduction; Reduce rate or frequency ( <i>Cycocel</i> )	Unspecified
		Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)	10 to 20 ppm spray x 1	<i>C. carpatica</i> cultivars are very sensitive to paclobutrazol, recommends 15 ppm spray ( <i>Pilon 2006</i> ); <i>C. carpatica</i> may require 10 to 20 ppm sprays, especially later in the spring; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			15 ppm spray x 1 to 3	<i>C. carpatica</i> : Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified
			3 ppm drench x 1		
		Concise/Sumagic	2 to 4 ppm spray x 1	<i>C. carpatica</i> cultivars are very sensitive to uniconazole, recommends 2.5 ppm; ( <i>Pilon 2006</i> ); <i>C. carpatica</i> may require 2 to 4 ppm sprays, especially later in the spring; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
		Topflor	10 to 30 ppm spray x 1	Rate range determined largely under mid-Atlantic conditions using medium-vigor cultivars; Adjust for your area ( <i>Label</i> )	Unspecified

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b><i>Canna x generalis</i></b> <b><i>Canna x orchiodes</i></b> (Hybrid Canna)	To control plant growth	<b>Dazide/B-Nine</b>	Not responsive at 7,500 ppm spray x 1	No growth reduction, but delayed flowering ( <i>Auburn Univ.</i> )	South
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczo/Downsize</b> (drenches only)	66 to 99 ppm spray x 1	C. x orchiodes requires higher rates ( <i>Auburn Univ.</i> )	South
			1 to 4 ppm drench x 1	For height control of Cannova series; apply 2 weeks after transplant at volume appropriate for the growing container ( <i>Ball Hort</i> )	Unspecified
			Topflor	Less than 50 ppm spray x 1	50 ppm spray reduced vegetative height of C. x orchiodes approximately 40% up to 8 weeks after treatment; No delay in flowering ( <i>Auburn Univ.</i> )
		50 to 80 ppm spray x 1		Rate range determined largely under mid-Atlantic conditions using medium-vigor cultivars; Adjust for your area ( <i>Label</i> )	Unspecified
<b><i>Carex buchananii</i></b> <b><i>Carex comans</i></b>	To control plant growth	<b>Concise/Sumagic</b>	20 ppm spray x 1	Moderate height control of C. flagellifera Toffee Twist with an increase in early tillers. Use lower rate on C. buchananii and C. comans Frosted Curly, this rate reduced height excessively on both cultivars and reduced number of tillers on Frosted Curly ( <i>Univ. Florida</i> )	South
<b><i>Carex flagellifera</i></b> (Sedges)	To increase tillering	<b>Configure</b>	Not responsive at 500 or 1,000 ppm spray x 1	No increase in number of tillers on C. buchananii, C. comans Frosted Curly, C. flagellifera Toffee Twist up to 8 weeks after treatment; No effect on plant height ( <i>Univ. Florida</i> )	Branching
<b><i>Caryopteris x clandonensis</i></b> (Bluebeard)	To control plant growth	<b>Dazide/B-Nine</b>	Not responsive at 5,000 ppm spray x 2	Dark Knight not responsive ( <i>Virginia Tech</i> )	South
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	Not responsive at 5,000/1,500 ppm spray x 1	Dark Knight not responsive ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczo</b>	Not responsive at 160 ppm spray x 1	Dark Knight not responsive ( <i>Virginia Tech</i> )	South
		<b>Concise/Sumagic</b>	30 ppm spray x 1	Good control of Dark Knight ( <i>Virginia Tech</i> )	South
<b><i>Centaurea montana</i></b>	To control plant growth	<b>Dazide/B-Nine</b>	2,500 to 5,000 ppm spray x 1 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
		<b>Concise/Sumagic</b>	7 to 15 ppm spray	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
<b><i>Coreopsis grandiflora</i></b> (Tickseed)	To control plant growth	<b>Abide/A-Rest</b>	0.375 mg a.i. drench x 1	Moderate growth control of Early Sunrise and enhanced flowering with 3.3 fl. oz./pot; Drench volume and mg a.i. vary with pot size ( <i>Tenn. Tech. Univ.</i> )	South
			100 ppm spray x 3	3 applications at 10-day intervals resulted in moderate control of Sunray ( <i>Michigan State Univ.</i> )	North
			25 to 50 ppm spray x 2 to 3	Apply at weekly intervals ( <i>Pilon 2006</i> )	
		<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	Good control of Sunray with multiple applications to 10- to 14-day intervals under nursery conditions ( <i>Virginia Tech</i> )	South
			2,500 to 5,000 ppm spray x 2 to 3	Apply 2,500 ppm at weekly intervals; Also recommends tank mix 2,000 ppm daminozide + 15 ppm paclobutcazol x 2 to 3 or a tank mix of 2,000 ppm daminozide + 3 ppm uniconazole ( <i>Pilon 2006</i> )	North
				Apply 3,750 ppm early in production and 5,000 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); 5,000 ppm spray x 3 applications at 10-day intervals resulted in excessive growth reduction of Sunray ( <i>Michigan State Univ.</i> )	
			2,500 ppm spray x 1	Control of Heliot and Santa Fe ( <i>Syngenta Culture Sheets</i> ). Apply one week after pinching to control growth of SunKiss or Utopia Series cultivars ( <i>Walters Gardens Culture Sheet</i> )	
			5,000 ppm spray x 2	Foliar sprays at 5,000 ppm applied twice after transplant work well; First application can be done 2 weeks after transplant followed by a second application 2 weeks later; Early Sunrise requires more PGRs than Rising Sun or Sunfire ( <i>Ball Hort</i> )	Unspecified
2,500 ppm spray x 1 to 2	Good control with Baby Sun liners in California ( <i>Univ. Calif.</i> )	South			

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Coreopsis grandiflora</b> (Tickseed) <i>continued</i>	To control plant growth <i>continued</i>	<b>Citadel/Cycocel</b>	1,250 ppm spray x 2 to 3	Apply at weekly intervals ( <i>Pilon 2006</i> ); 3 applications of 1,500 ppm at 10-day intervals resulted in moderate growth reduction of Sunray ( <i>Michigan State Univ.</i> )	North
			1,500 ppm spray x 3		
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Moderate control of Sunray; Multiple applications may be required ( <i>Univ. Georgia, Virginia Tech</i> )	South
			2,500 + 1,000 ppm spray x 2 to 3	Apply at weekly intervals ( <i>Pilon 2006</i> )	North
			2,500 + 1,250 ppm spray x 1	Excessive control with Baby Sun liners in California ( <i>Univ. Calif.</i> )	South
			Greater than 2,500 + 1,500 ppm spray x 1	Label rate: Increase daminozide rate for better control of Baby Sun and Sunray ( <i>Cycocel</i> )	Unspecified
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)</b>	80 to 100 ppm spray x 1	Sunray and Baby Sun responsive to sprays or drench; Drenches applied at 2 fl. oz. per qt. pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South
			5 to 10 ppm drench x 1		
			2.5 mg a.i. drench x 1	Applied as 3.3 fl. oz./pot; Moderate growth control of Early Sunrise and enhanced flowering; Drench volume and mg a.i. vary with pot size ( <i>Tenn. Tech. Univ.</i> )	
			30 to 45 ppm spray x 2 to 3	Treat as leaves reach edge of pot; Spray applications at weekly intervals; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
			6 ppm drench x 1	3 applications of 30 ppm at 10-day intervals resulted in good control of Sunray ( <i>Michigan State Univ.</i> )	
			3 to 6 ppm spray x 1	Control of Heliot and Santa Fe; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Culture Sheets</i> )	Unspecified
			2 ppm drench x 1		
			Less than 5 ppm spray x 1 for liners	Excessive control with Baby Sun plugs in California ( <i>Univ. Calif.</i> )	South
		<b>Concise/Sumagic</b>	40 ppm spray x 1	May delay flowering of Sunray ( <i>Univ. Georgia, Virginia Tech</i> )	South
			15 ppm spray x 2		
			0.25 mg a.i. drench x 1	Moderate growth control of Early Sunrise and enhanced flowering with 3.3 fl. oz./pot; Drench volume and mg a.i. vary with pot size ( <i>Tenn. Tech. Univ.</i> )	
			5 ppm spray x 2 to 3	Excellent control of Early Sunrise; Also recommends tank mix of 3 ppm uniconazole + 2,000 ppm daminozide ( <i>Pilon 2006</i> )	North
			5 to 10 ppm spray x 1	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	
			2 to 4 ppm spray x 1	Control of Heliot and Santa Fe ( <i>Syngenta Culture Sheet</i> )	Unspecified
			5 ppm spray x 1	Apply one week after pinching to control growth of SunKiss or Utopia Series cultivars ( <i>Walters Gardens Culture Sheet</i> )	North
		Topflor	150 ppm spray x 1	Reduced height and days to flower of Early Sunrise ( <i>Auburn Univ.</i> )	South
		<b>Coreopsis rosea</b> (Pink Coreopsis)	To control plant growth	<b>Dazide/B-Nine</b>	1,500 to 2,500 ppm spray x 1
5,000 to 7,500 ppm spray x 1	Good growth control of American Dream with little effect on flowering ( <i>Auburn Univ.</i> )				South
<b>Citadel/Cycocel</b>	1,500 ppm spray x 6			Good control of growth of Sweet Dreams and the hybrid Limerock Ruby with 6 weekly applications ( <i>Michigan State Univ.</i> )	North
<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)</b>	4 to 8 ppm liner soak x 1			Moderate response to lower rate with Sweet Dreams; Rates up to 8 ppm resulted in good control ( <i>Virginia Tech</i> )	South
	6 ppm drench x 1			Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
	90 ppm spray x 6			Good control of growth of Sweet Dreams and the hybrid Limerock Ruby with 6 weekly applications ( <i>Michigan State Univ.</i> )	
	40 ppm spray x 1 2 ppm drench x 1			Results on finished plants in California; Drench volume and mg a.i. vary with container size ( <i>Univ. Calif.</i> )	South

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
		<b>Concise</b> /Sumagic	40 ppm spray x 1	Moderate control of American Dream; Multiple applications may be required ( <i>Auburn Univ.</i> )	South
			0.5 ppm liner soak x 1	Good growth control of Sweet Dreams ( <i>Virginia Tech</i> )	
			2 to 4 ppm spray x 1	Effective on American Dream ( <i>Ball Hort</i> )	Unspecified
		Topflor	75 to 100 ppm spray x 1	Moderate control of American Dream; Multiple applications may be required ( <i>Auburn Univ.</i> )	South
<b>Coreopsis verticillata</b> (Thread Leaf Coreopsis)	To control plant growth	<b>Abide</b> /A-Rest	6 ppm drench x 1	Drench applied at 2 fl. oz. per 4-in. pot; Volume and mg a.i. vary with pot size ( <i>Auburn Univ.</i> )	South
		<b>Collate</b> /Florel	500 to 1,000 ppm spray x 1 to 3	No effect on Moonbeam plant growth or days to flower, but 40% increase in number of flower inflorescences. With stock plants, good growth control of Moonbeam with 4 biweekly sprays of 600 ppm; Increased branching; Removed flower buds ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine	5,000 ppm spray x 2 to 3	Good control, but slight flower delay with Moonbeam and overwintered Golden Gain; Apply at 10- to 14-day intervals ( <i>Univ. Georgia and Virginia Tech</i> )	South
			5,100 ppm spray x 1	Moderate control of Moonbeam ( <i>Auburn Univ.</i> )	
			2,500 to 5,000 ppm spray 1 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ). Good control of Cruizin' Main Street ( <i>Pilon 2015</i> )	North
			1,500 to 2,500 ppm spray x 1 to 3	Effective on Moonbeam and Zagreb ( <i>Ball Hort</i> )	Unspecified
			Tank mix	1 or 2 weekly applications of a tank mix of 3 ppm uniconazole + 2,000 ppm daminozide sprays gives good control for Cruizin' Main Street ( <i>Pilon 2015</i> )	North
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1	Effective on overwintered Golden Gain ( <i>Virginia Tech</i> )	South
			Greater than 2,500 + 1,500 ppm spray x 1	Label rate: Increase daminozide rate for better control of Zagreb and Golden Gain ( <i>Cycocel</i> )	Unspecified
		<b>Citadel</b> /Cycocel	Not responsive at 1,500 ppm spray x 1	Overwintered Golden Gain not responsive ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/ Paczol/Downsize (drenches only)	Not responsive at 160 ppm spray x 1	Spray application not effective on Moonbeam ( <i>Univ. Georgia</i> ) or overwintered Golden Gain ( <i>Virginia Tech</i> ); Drench applied to Moonbeam at 2 fl. oz. per 4-in. pot; Volume and mg a.i. vary with pot size; Some distortion of laterals with this drench rate ( <i>Auburn Univ.</i> )	South
			Less than 6 ppm drench x 1		
			30 to 60 ppm spray x 1	Good control of Cruizin' Main Street ( <i>Pilon 2015</i> )	
			1 to 2 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Pacific Plug &amp; Liner Production Info</i> )	North
		<b>Concise</b> /Sumagic	15 to 20 ppm spray x 1	Good control of Moonbeam with spray application, but excessive growth reduction at 1 ppm drench; Test rates approximately 0.5 ppm; Drench applied as 2 fl. oz. per qt. pot; Volume and mg a.i. vary with pot size; Growth of overwintered Golden Gain was moderately responsive at 45 ppm spray x 1; Multiple applications necessary ( <i>Virginia Tech</i> )	South
			Less than 1 ppm drench x 1		
2 to 4 ppm spray x 1	Effective on Moonbeam and Zagreb ( <i>Ball Hort</i> )		Unspecified		
5 to 10 ppm spray x 1 to 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ). One 5 to 7 ppm spray of uniconazole gives good control for Cruizin' Main Street ( <i>Pilon 2015</i> )		North		
Topflor	75 to 100 ppm spray x 1	Good growth control of Moonbeam with no delay in flowering; Higher rates resulted in high-quality ratings ( <i>Auburn Univ.</i> )	South		
<b>Coreopsis</b>	Induce lateral or basal branching on liners or finished plants	<b>Configure</b>	300 to 600 ppm spray x 1	Various cultivars including American Dreams, Sweet Dreams, Moonbeam, Rum Punch and Zagreb are responsive to a single foliar application to increase lateral and basal branching in liners and finished plants; Multiple applications may improve response ( <i>Virginia grower, Virginia Tech</i> )	Branching

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Cortaderia selloana</b> (Pampas Grass)	To control plant growth	<b>Abide/A-Rest</b>	4 mg a.i. drench x 1	Moderate growth control, but may not be an economical treatment; Drench volume and mg a.i. vary with pot size ( <i>NC State Univ.</i> )	South
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	1 to 2 mg a.i. drench x 1	Good control of plant growth, shorter, but less diameter as well; Volume and mg a.i. vary with pot size ( <i>NC State Univ.</i> )	South
		<b>Concise/Sumagic</b>	Less than 1 mg a.i. drench x 1	This rate resulted in continued growth regulation under landscape conditions; Test lower rates; Volume and mg a.i. vary with pot size ( <i>NC State Univ.</i> )	South
	40 ppm spray x 1		Good height control of Rosea with no effect on tiller number ( <i>Univ. Florida</i> )		
To increase tillering	<b>Configure</b>	Not responsive to 500 or 1,000 ppm spray x 1	Rosea not responsive in increasing number of tillers ( <i>Univ. Florida</i> )	Branching	
<b>Delosperma cooperi</b>	To control plant growth	<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	80 ppm spray x 1	Short term control of Table Mountain with spray application; Multiple applications required. Excessive reduction in growth with 10 ppm drench at 2 fl. oz. per quart pot ( <i>Virginia Tech</i> )	South
			Less than 10 ppm drench x 1		
	To induce lateral branching	<b>Configure</b>	Not responsive at 600 ppm spray x 2	Not responsive to our screening rate; Higher rates may be effective ( <i>Virginia Tech</i> )	Branching
<b>Delphinium x elatum</b> (Larkspur, Hybrid Bee Delphinium)	To control plant growth	<b>Abide/A-Rest</b>	4 ppm drench x 1	Apply as flower stalks start to elongate; Good control of Blue Bird; Drench applied at 10 fl. oz. per trade gal. pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South
			100 ppm spray x 3 to 6	Applications 7 to 14 days apart resulted in stunting of Volkerfreiden; Good control of Magic Fountain and Pacific Giants ( <i>Michigan State Univ.</i> )	North
			5 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	
		<b>Collate/Florel</b>	750 ppm spray x 4	Good growth control of Guardian with weekly sprays; Some flower delay. No control of Pacific Giants with 500 ppm sprays x 4 at 2-week intervals; Delayed flowering ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine</b>	Not responsive at 5,000 ppm spray x 2	Astolat not responsive ( <i>Virginia Tech</i> )	South
			5,000 ppm spray x 3 to 6	Applications 7 to 14 days apart gave moderate control of Volkerfreiden; Good control of Guardian and Magic Fountain, but no control of Pacific Giants ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine + Citadel/Cycocel</b> Tank Mix	Not responsive at 5,000 + 1,500 ppm spray x 1	Astolat not responsive ( <i>Virginia Tech</i> )	South
		<b>Citadel/Cycocel</b>	1,500 ppm sprays x 4 to 6	Weekly applications gave moderate control of Volkerfreiden and Guardian, but were not effective on Magic Fountain and Pacific Giants ( <i>Michigan State Univ.</i> )	North
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	40 to 100 ppm spray x 1	Moderate control of Astolat at lower rates and of Black Knight at higher rates; Multiple applications may be necessary; Blue Bird height not responsive to 60 ppm spray x 1; Slight reduction in width ( <i>Virginia Tech</i> )	South
			Less than 2 ppm drench x 1	Blue Bird was very sensitive to drenches; Drench applied at 10 fl. oz. per qt. pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	
			30 ppm spray x 1 to 2	For the Guardian series, make first application just as the flower stem is just beginning to rise above the basal foliage and second application 7 to 10 days later if necessary ( <i>Pilon, GPN 2005</i> )	North
		Rates greater than 30 ppm sprays or more frequent applications resulted in stunting of other cultivars ( <i>Michigan State Univ.</i> )			
			Million Dollar Sky apply once when flower stems begin to grow beyond the foliage ( <i>Walters Gardens Culture Sheet</i> )	North	

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION	
			20 ppm spray x 1 or 2	Apply first spray at 12-in. tall; Apply second spray 2 weeks later if needed; Apply drench 1 week after transplant; Volume and mg a.i. vary with pot size ( <i>OHP PGR Solutions</i> ); For Guardian F1 Series, apply 20 ppm spray as needed ( <i>PanAmerican Seed, 2018</i> )	Unspecified	
			2 to 4 ppm drench x 1			
			15 ppm spray x 1 to 2			
			30 to 60 ppm spray x 2			
		<b>Concise/Sumagic</b>	30 to 45 ppm spray x 1	For Astolat, multiple applications may be required ( <i>Virginia Tech</i> )	South	
			1 ppm drench x 1	Very short-term response with Blue Bird; Multiple applications or higher rate required; Drench applied at 10 fl. oz. per trade gal. pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )		
			5 ppm spray x 1 to 2	For the Guardian series, make first application just as the flower stem is just beginning to rise above the basal foliage and second application 7 to 10 days later if necessary ( <i>Pilon, GPN 2005</i> ) Million Dollar Sky apply once when flower stems begin to grow beyond the foliage ( <i>Walters Gardens Culture Sheet</i> )	North	
			1 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North	
			Topflor	15 ppm spray x 1	Good control of Blue Bird ( <i>Virginia Tech</i> )	South
				6 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
To increase branching	<b>Configure</b>	Not responsive at 600 ppm spray x 1	Galahad not responsive to our screening rate; Higher rates may be effective ( <i>Virginia Tech</i> )	Branching		
<b>Delphinium grandiflorum</b>	To control plant growth	<b>Abide/A-Rest</b>	25 to 50 ppm spray x 2	Make first application just as the flower stem is beginning to rise above the basal foliage and second application 7 days later if necessary ( <i>Pilon 2006</i> )	North	
			100 ppm spray x 4 to 5	Applications 7 to 14 days apart gave excellent control of Summer Blues, but caused stunting of Sky Blue and Summer Nights; Reduce frequency of application ( <i>Michigan State Univ.</i> )		
		<b>Collate/Florel</b>	500 ppm spray x 4	Good growth control of Sky Blue with 4 sprays at 2-week intervals; Little flower delay ( <i>Michigan State Univ.</i> )	North	
		<b>Dazide/B-Nine</b>	2,500 ppm spray x 2	Make first application just as the flower stem is beginning to rise above the basal foliage and second application 7 days later if necessary ( <i>Pilon 2006</i> )	North	
			Tank mix	2 spray applications of 2,000 ppm daminozide + 15 ppm paclobutrazol or 2,000 ppm daminozide + 3 ppm uniconazole; Make first application just as the flower stem is beginning to rise above the basal foliage and second application 7 days later if necessary ( <i>Pilon 2006</i> )		
			Not responsive at 5,000 ppm spray x 4 to 5	Applications 7 to 14 days apart gave no control of Summer Blues, Sky Blue or Summer Nights ( <i>Michigan State Univ.</i> )		
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	2,500 + 1,000 ppm spray x 2	Make first application just as the flower stem is beginning to rise above the basal foliage and second application 7 days later if necessary ( <i>Pilon 2006</i> )	North	
		<b>Citadel/Cycocel</b>	1,500 ppm spray x 4 to 5	Applications 7 to 14 days apart gave good control of Summer Blues, but no control of Sky Blue or Summer Nights ( <i>Michigan State Univ.</i> )	North	
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	30 ppm spray x 2	Make first application just as the flower stem is beginning to rise above the basal foliage and second application 7 days later if necessary ( <i>Pilon 2006</i> ) Rates greater than 30 ppm sprays or more frequent applications resulted in stunting of some cultivars ( <i>Michigan State Univ.</i> )	North	
			15 to 20 ppm spray x 1 to 2	For Delfix series, apply 1 or 2 applications of 15 ppm 10 to 14 days apart ( <i>Syngenta Culture Sheets</i> ). For Diamonds Blue F1 apply 20 ppm spray as needed ( <i>PanAmerican Seed, 2018</i> )	Unspecified	

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Delphinium grandiflorum</i> <i>continued</i>	To control plant growth <i>continued</i>	Concise/Sumagic	5 ppm spray x 2	Make first application just as the flower stem is beginning to rise above the basal foliage and second application 7 days later if necessary ( <i>Pilon 2006</i> )	North
				A single application of 5 ppm spray at 10 days after potting gave excellent control of Summer Blues, but the 15 ppm spray rate with more frequent applications resulted in stunting of Sky Blue and Summer Nights and 10 ppm spray applied twice stunted Pacific Giants ( <i>Michigan State Univ.</i> )	
<i>Dianthus gratianopolitanus</i> (Cheddar Pinks)	To control plant growth	Dazide/B-Nine	2,500 ppm spray x 1	Growth regulators typically not required, but daminozide can be applied if growing conditions cause stretch ( <i>Ball Hort</i> )	Unspecified
			Tank mix	A single spray of 2,000 ppm daminozide + 3 ppm uniconazole ( <i>Pilon 2006</i> )	North
<i>Dianthus barbatus</i> (Sweet William)  <i>Dianthus hybrida</i>	To control plant growth	Abide/A-Rest	100 ppm spray x 4	Four spray applications at 2-week intervals gave moderate control ( <i>Michigan State Univ.</i> )	North
		Collate/Florel	Not responsive at 500 ppm spray x 4	No response to 4 spray applications at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		Dazide/B-Nine	2,500 to 3,000 ppm spray x 1 to 2	Effective on Barbarini hybrids ( <i>Syngenta Flowers Culture Sheet</i> ); If needed for height control ( <i>Walters Gardens Culture Sheet</i> )	Unspecified
			2,500 to 3,750 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); No response to 4 spray applications of 5,000 ppm at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		Dazide/B-Nine + Citadel/Cycocel Tank Mix	2,000 + 1000 ppm spray x 1	Coconut Punch, apply daminozide + chlormequat Cl tank mix spray, or 2000 ppm daminozide + 3 ppm uniconazole spray, as needed to maintain compact growth ( <i>Proven Winners 2017 Perennial-Shrub Culture Guide</i> )	Unspecified
		Citadel/Cycocel	Not responsive at 1,500 ppm spray x 4	No response to 4 spray applications at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)	5 to 8 ppm spray x 1 to 2	For Barbarini, Charms, Diabunda, Dulce, Elation, Fandango, Super Farfait and Venti Parfait hybrids ( <i>Syngenta Flowers Culture Sheet</i> )	Unspecified
			60 ppm spray x 4	4 spray applications at 2-week intervals gave excellent control ( <i>Michigan State Univ.</i> ); Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
			6 ppm drench x 1		
			15 to 20 ppm spray x 1	Bouquet F1 Series, Rockin' Red F1, as needed ( <i>PanAmerican Seed</i> )	Unspecified
			5 ppm spray x 1	Good control of liners of Stagirond (Rondo mix) ( <i>Univ. Calif.</i> )	South
		Concise/Sumagic	45 ppm spray x 1 to 3 6 ppm drench x 1	Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified
			3 to 5 ppm spray x 1 to 2	Effective on Barbarini hybrids ( <i>Syngenta Flowers Culture Sheet</i> )	Unspecified
			15 ppm spray x 1	Single application early in production ( <i>Oklahoma grower, Sumagic Advisor 2004</i> )	South
			15 ppm spray x 4 1 ppm drench x 1	4 spray applications at 2-week intervals gave excellent control ( <i>Michigan State Univ.</i> ); Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
<i>Dicentra spectabilis</i> (Common Bleeding Heart)	To control plant growth, make first spray application as soon as shoot growth is visible; Second application 5 days later ( <i>NC State Univ.</i> )	Abide/A-Rest	Less than 50 ppm spray x 2	This rate was phytotoxic causing leaf tip chlorosis; Higher rates reduced number of flowers ( <i>NC State Univ.</i> )	South
			50 to 100 ppm spray x 1 to 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			26 ppm spray x 1	Spray rates above 132 ppm cause curling and burn of foliage; Drench volume and mg a.i. vary with pot size ( <i>SePro Specific Species and Application Rates</i> )	Unspecified
			2 ppm drench x 1		

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION		
		<b>Dazide</b> /B-Nine	3,000 ppm spray x 2	Slight (approximately 4 days) delay in flowering ( <i>NC State Univ.</i> )	South		
			2,000 to 2,500 ppm spray x 2	Begin applications when Valentine plants reach 3-in. tall and reapply as needed at 7- to 10-day intervals ( <i>Pilon 2013</i> )	North		
		<b>Citadel</b> /Cycocel	Not responsive at 2,000 ppm spray x 2	( <i>NC State Univ.</i> )	South		
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	50 ppm spray x 2	No effect on plant flowering ( <i>NC State Univ.</i> )	South		
		<b>Concise</b> /Sumagic	1 to 5 ppm spray x 2	Excellent growth control with no delay in flowering ( <i>NC State Univ.</i> )	South		
<b>Digiplexis Illumination Flame</b>	To control plant growth	<b>Concise</b> /Sumagic	10 ppm spray x 1	Spray just as the flower spikes are beginning to elongate ( <i>Pilon 2014</i> )	North		
	To enhance lateral branching	<b>Configure</b>	600 ppm spray x 1	Enhanced lateral branching; This was our test rate; Lower rates may be effective ( <i>Virginia Tech</i> )	Branching		
<b>Digitalis purpurea</b> (Foxglove)	To control plant growth	<b>Abide</b> /A-Rest	25 ppm spray x 2 to 3	To control plant growth, apply just as inflorescence begins to elongate above foliage; 2 to 3 spray applications 7 days apart; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> ) ( <i>Walters Gardens Culture Sheet</i> )	North		
			5 ppm drench x 1				
			Rates not tested			For Camelot series, Syngenta only recommends application before elongation of flower spike; Will respond to ancymidol ( <i>GreenLeaf Plants Technical Guide</i> )	Unspecified
			15 ppm spray x 1			Effective on Foxy; Drench volume and mg a.i. vary with pot size ( <i>Univ. Calif.</i> )	South
			4 ppm drench x 1				
		<b>Collate</b> /Florel	500 ppm spray x 4	Good growth control of Foxy with 4 sprays at 2-week intervals; Delayed flowering ( <i>Michigan State Univ.</i> )	North		
		<b>Dazide</b> /B-Nine	Not responsive at 5,000 ppm spray x 4	Foxy not responsive to multiple applications ( <i>Univ. Georgia</i> )	South		
			5,000 ppm spray x 4	Good control of Foxy with 4 applications at 2-week intervals ( <i>Michigan State Univ.</i> )	North		
			2,500 ppm spray x 2 to 3	Weekly applications as necessary ( <i>Pilon 2006</i> )	Unspecified		
			2,500 ppm spray x 1 to 2	Virtuoso hybrids: Apply just as the flower spike begins to elongate ( <i>Syngenta Crop Growing Guidelines</i> ); 2,500 to 3,000 for Dalmatian F1 series ( <i>PanAmerican Seed, 2018</i> )			
			2,500 to 3,500 ppm spray x 1 on plugs	PGRs applied to Camelot in the plug stage will produce a more compact plant that is easier to ship ( <i>Syngenta Crop Growing Guidelines</i> )			
			Rates not tested	For Camelot series, Syngenta only recommends application before elongation of flower spike; Will respond to daminozide ( <i>GreenLeaf Plants Technical Guide</i> )			
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	Not responsive at 5,000 + 1,500 ppm spray x 1	Foxy not responsive ( <i>Univ. Georgia</i> )	South		
		<b>Citadel</b> /Cycocel	1,500 ppm spray x 4	Good control of Foxy with 4 applications at 2-week intervals ( <i>Michigan State Univ.</i> )	North		
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	30 ppm spray x 2 to 3	Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North		
			6 ppm drench x 1				
			45 ppm spray x 1 to 3 10 ppm drench x 1	Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified		
			80 to 160 ppm spray x 1 2 to 4 ppm drench x 1	Label rate: Drench volume and mg a.i. vary with pot size			
			5 to 10 ppm spray x 1	Dalmatian F1 Series, apply spray as needed ( <i>PanAmerican Seed, 2018</i> )			

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Digitalis purpurea</i> (Foxglove) <i>continued</i>	To control plant growth <i>continued</i>	<b>Concise/Sumagic</b>	30 ppm spray x 1	Excellent height control of Foxy; Moderate width reductions ( <i>Univ. Georgia</i> )	South
			5 ppm spray x 2 to 3 1 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
			5 ppm spray x 2	Recommendations for Virtuoso hybrids; Apply just as the flower spike begins to elongate ( <i>Syngenta Crop Growing Guidelines</i> ); Two applications 7 days apart should provide good control ( <i>Walters Gardens Culture Sheet</i> ); Spray as needed for Dalmatian F1 series ( <i>PanAmerican Seed, 2018</i> )	Unspecified
			3 ppm spray x 1 on plugs	PGRs applied in the plug stage will produce a more compact plant that is easier to ship; Camelot will respond to uniconazole ( <i>Syngenta Flowers Growing Guidelines</i> )	
			Rates not tested	For Camelot series, Syngenta only recommends application before elongation of flower spike; Will respond to uniconazole ( <i>GreenLeaf Plants Technical Guide</i> )	
		Topflor	6+ ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
<i>Echinacea purpurea</i>  <i>Echinacea hybrids</i> (Purple Coneflower)	To control plant growth To control plant growth	<b>Abide/A-Rest</b>	25 ppm spray x 2 to 3	Apply sprays weekly beginning when flower stalks are near leaf canopy and beginning to elongate ( <i>Pilon 2006</i> )	North
			50 to 100 ppm spray x 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); 6 weekly applications at 100 ppm stunted Magnus ( <i>Michigan State Univ.</i> )	
		<b>Collate/Florel</b>	500 ppm spray x 1	Moderate growth control of White Swan; No flower data ( <i>Virginia Tech</i> )	South
			500 ppm spray x 3	Biweekly sprays gave moderate growth regulation of Bravado with no effect on flower date or number of inflorescences or branches; 1,000 ppm x 3 reduced growth and delayed flowering slightly ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	Apply at 10- to 14-day intervals for control of Bravado and Magnus ( <i>Virginia Tech</i> )	South
			5,000 ppm spray x 6	Weekly applications gave good control of Magnus ( <i>Michigan State Univ.</i> )	North
			2,500 ppm spray x 2 to 3	Apply sprays weekly beginning when flower stalks are near leaf canopy and beginning to elongate ( <i>Pilon 2006</i> )	
		<b>Citadel/Cycocel</b>	1,250 to 1,500 ppm spray x 2 to 6	Apply 1,250 ppm sprays weekly 2 to 3 times beginning when flower stalks are near leaf canopy and beginning to elongate ( <i>Pilon 2006</i> ); 6 weekly applications at 1,500 ppm gave excellent control of Magnus ( <i>Michigan State Univ.</i> )	North
			<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1 to 2	Good control of Magnus; May require multiple applications at 10- to 14-day intervals ( <i>Virginia Tech</i> )
		2,500 + 1,250 ppm spray x 2 to 3		Apply weekly sprays beginning when flower stalks are near leaf canopy and beginning to elongate ( <i>Pilon 2006</i> )	North
		2,500 + 750 ppm spray x 1		Recommends after using Configure (see below), if additional height control is necessary on tissue culture Echinacea ( <i>Fifo, GrowerTalks, 2010</i> )	Unspecified
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)</b>	120 ppm spray x 1	Moderate control of Doubledecker; Multiple applications required ( <i>Virginia Tech</i> )	South
			15 ppm spray x 3 to 4	First spray before budding; Evaluate weekly to determine need for additional control ( <i>Virginia grower</i> )	
			30 to 90 ppm spray x 2 to 6	Apply 30 ppm sprays 2 to 3 times weekly beginning when flower stalks are near leaf canopy and beginning to elongate ( <i>Pilon 2006</i> ). 6 weekly applications at 90 ppm gave good control of Magnus ( <i>Michigan State Univ.</i> )	North
			6 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION	
			15 ppm spray x 2	Use multiple spray applications or a single drench for Prairie Splendor; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Culture Sheets</i> )	Unspecified	
			2 to 3 ppm drench x 1			
			30 to 40 ppm spray x 1 to 2			
			4 to 6 ppm drench x 1			
			2 to 4 ppm liner soak x 1			
			45 ppm spray x 1 to 3			
		6 ppm drench x 1	Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )			
		30 ppm spray x 1 to 2				
		Concise/Sumagic		5 to 10 ppm spray x 2 to 3	Apply 5 ppm sprays weekly beginning when flower stalks are near leaf canopy and beginning to elongate; Also recommends 2,500 ppm daminozide + 5 ppm uniconazole applied 2 to 3 times at weekly intervals; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> ); Three 10 ppm sprays applied at 2-week intervals beginning at bolting provided good control of Magnus with no effect on flowering ( <i>Michigan State Univ.</i> )	North
				1 ppm drench x 1		
				30 to 40 ppm spray x 1		
			45 ppm spray x 1	Multiple applications of lower rate may be applied as necessary ( <i>Label</i> )	Unspecified	
Topflor		22 ppm spray x 2	Short-term control of Ruby Star; Multiple applications may be required ( <i>Virginia Tech</i> )	South		
		22 ppm spray x 2 to 3				
	To increase basal branching	Configure	300 to 600 ppm spray x 1 to 2 on liners or finished plants	Increases basal branching; Multiple applications may be required; Little effect on plant height. Do NOT use on cultivars in the Sombrero or Pow Wow series ( <i>Virginia Tech</i> )	Branching	
<b><i>Erysimum linifolium</i></b> (Wallflower)	To control plant growth	Dazide/B-Nine	5,000 ppm spray x 2	Multiple applications at 10-14 day intervals ( <i>Virginia Tech</i> )	South	
		Dazide/B-Nine + Citadel/Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1			May require multiple applications ( <i>Virginia Tech</i> )
		Piccolo/Piccolo 10 XC/Bonzi/Paczol	80 to 120 ppm spray x 1			Moderate control ( <i>Virginia Tech</i> )
		Concise/Sumagic	15 ppm spray x 1			Good control ( <i>Virginia Tech</i> )
		Topflor	30 ppm spray x 1			Good control ( <i>Virginia Tech</i> )
<b><i>Eupatorium coelestinum</i></b> (Hardy Ageratum)	To control plant growth	Dazide/B-Nine	Not responsive at 5,000 ppm spray x 2	Not responsive ( <i>Univ. Georgia</i> )	South	
		Piccolo/Piccolo 10 XC/Bonzi/Paczol	Not responsive at 240 ppm spray x 1			Moderate control with drenches applied at 2 fl. oz. per quart pot ( <i>Univ. Georgia</i> )
			8 to 10 ppm drench x 1			
		Concise/Sumagic	60 ppm spray x 1			Drench applied at 4 fl. oz. per quart pot ( <i>Univ. Georgia</i> )
Not responsive at 1 ppm drench x 1						
<b><i>Eupatorium rugosum</i></b> (Chocolate Bonset, White Snake Root)	To control plant growth	Concise/Sumagic	60 to 90 ppm spray x 1 to 3	Moderate, short-term growth control. Multiple applications recommended required. Drench applied at 2 fl. oz. per quart pot ( <i>Virginia Tech</i> )	South	
			4 ppm drench x 1			
			2 to 6 ppm liner soak x 1			
<b><i>Euphorbia dulcis</i></b> (Purple Spurge)	To increase branching	Configure	600 ppm spray x 1	Chameleon: This rate was our screening rate. Lower rates may be effective ( <i>Virginia Tech</i> )	Branching	

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Euphorbia hybrid</b> (Wood Spurge)	To control plant growth	<b>Dazide</b> /B-Nine	Not responsive at 5,000 ppm spray x 3	Efanthia and Despina: Not responsive ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	Not responsive at 5,000 + 1,500 ppm spray x 2	Efanthia and Despina: Not responsive ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	40 to 80 ppm spray x 1	Efanthia and Despina: Good control ( <i>Virginia Tech</i> )	South
			30 ppm spray	( <i>Pilon 2012</i> )	North
		<b>Concise</b> /Sumagic	30 ppm spray x 1	Efanthia and Despina: Good control ( <i>Virginia Tech</i> )	South
			5 ppm spray x 1 to 2	Multiple applications may be required ( <i>Pilon 2012</i> )	North
		Topflor	30 ppm spray x 1	Efanthia and Despina: Good control ( <i>Virginia Tech</i> )	South
			45 ppm spray x 1	Good control ( <i>Pilon 2012</i> )	North
<b>Gaillardia x grandiflora</b> (Blanket Flower)	To control plant growth	<b>Abide</b> /A-Rest	50 ppm spray x 3	Begin weekly applications when stems are rapidly elongating and before flower buds appear ( <i>Pilon 2006</i> )	North
			Tank mix	Spray tank mix of 15 ppm ancymidol + 2.5 ppm uniconazole as needed ( <i>SePro Specific Species and Application Rates</i> )	Unspecified
		<b>Collate</b> /Florel	500 ppm spray x 4	Growth control and delayed flowering of Burgundy with 4 sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			500 ppm spray x 1	One application after roots have established in final container to enhance branching ( <i>Walters Gardens Culture Sheet</i> )	
		<b>Dazide</b> /B-Nine	5,000 ppm spray x 3	Burgundy responsive; Apply at 10- to 14-day intervals; Goblin (Gold Kobold) not responsive at 5,000 ppm spray x 2 ( <i>Univ. Georgia</i> )	South
			3,750 ppm spray x 2 to 3	Begin weekly applications when stems are rapidly elongating and before flower buds appear; Also recommends tank mixes of 2,500 ppm daminozide + 30 ppm paclobutrazol x 3 or 2,500 ppm daminozide + 5 ppm uniconazole x 3 ( <i>Pilon 2006</i> )	North
			5,000 ppm spray x 4	Four applications at 2-week intervals gave excellent control of Burgundy ( <i>Michigan State Univ.</i> )	
			Tank mix	A tank mix of 3,750 ppm daminozide + 15 ppm paclobutrazol is effective at controlling height; Make first application after bud set, but before stem elongation and a second application before the first bud opens ( <i>Walters Gardens Cultural Sheets</i> )	
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1	Burgundy responsive to a single application; Goblin (Gold Kobold) not responsive ( <i>Univ. Georgia</i> )	South
			3,000 + 1,250 ppm spray x 3	Begin weekly applications when stems are rapidly elongating and before flower buds appear ( <i>Pilon 2006</i> )	North
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	Not responsive at 160 ppm spray x 1	Goblin (Gold Kobold) not responsive at 160 ppm spray x 1 or 5 ppm drench applied at 4 fl. oz. per qt. pot; Drench volume and mg a.i. vary with pot size ( <i>Univ. Georgia</i> )	South
			Not responsive at 5 ppm drench x 1		
			45 ppm spray x 3	Begin weekly applications when stems are rapidly elongating and before flower buds appear ( <i>Pilon 2006</i> )	North
			60 ppm spray x 4	Four applications at 2-week intervals gave excellent control of Burgundy ( <i>Michigan State Univ.</i> )	
		15 to 30 ppm spray x 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )		
		<b>Concise</b> /Sumagic	60 ppm spray x 1	Moderate control of Burgundy; May require multiple applications; Goblin (Gold Kobold) not responsive to uniconazole applied as a 60 ppm spray, a 5 ppm liner soak or a 2 ppm drench applied at 4 fl. oz. per qt. pot ( <i>Univ. Georgia, Virginia Tech</i> )	South

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION	
			7 to 15 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Begin weekly applications of 10 ppm sprays when stems are rapidly elongating and before flower buds appear ( <i>Pilon 2006</i> )	North	
	To induce lateral branching	<b>Configure</b>	600 ppm spray x 1 or 2 on liners or finished plants	Gallo Yellow, Dazzler and Gallo Red had increased branching, but EXCESSIVE DELAYS in flowering ( <i>Virginia Tech</i> )	Branching	
<b>Gaura lindheimeri</b> (White Gaura, Wand Flower, Butterflies)	To control plant growth	<b>Abide/A-Rest</b>	100 ppm spray x 4 to 5	Sprays at 7- to 14-day intervals gave excellent control of Rose, no control of Whirling Butterflies and stunted Blush; Reduce number of applications ( <i>Michigan State Univ.</i> )	North	
			50 ppm spray x 2	Multiple applications may be required ( <i>Univ. Minnesota</i> )		
				1 to 2 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>SePro Specific Species and Application Rates</i> )	Unspecified
		<b>Collate/Florel</b>	500 ppm spray x 4	No growth control of Whirling Butterflies with 4 sprays at 2-week intervals, but appeared to increase branching; Slight delay in flowering ( <i>Michigan State Univ.</i> )	North	
			500 ppm spray x 2	Moderate growth control of Corrie's Gold with 2 sprays at 2-week interval ( <i>Virginia Tech</i> )	South	
		<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	Effective on Siskiyou Pink and Whirling Butterflies; Apply at 10- to 14-day intervals ( <i>Virginia Tech</i> ) and Corrie's Gold ( <i>Auburn Univ.</i> )	South	
			5,000 ppm spray x 4 to 5	Multiple applications at 7- to 14-day intervals gave good control of Blush and Rose, but were not effective on Whirling Butterflies ( <i>Michigan State Univ.</i> )	North	
			3,000 to 4,000 ppm spray x 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )		
			2,500 ppm spray x 1 to 3	More upright cultivars will require multiple applications; Also recommends tank mix 2,000 ppm daminozide + 30 ppm paclobutrazol ( <i>Pilon 2006</i> )		
			3,000 ppm spray x 1	Effective growth control ( <i>Univ. Calif.</i> )	South	
			2,500 to 4,000 ppm spray x 1 to 3	The first application should be 7 to 10 days after the first pinch ( <i>Ball Hort</i> )	Unspecified	
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Good control of Corrie's Gold; Moderate control of Whirling Butterflies; Multiple applications may be required ( <i>Virginia Tech</i> )	South	
			2,500 + 750 to 1,000 ppm spray x 1	Sparkle White, multiple applications may be required ( <i>PanAmerican Seed, 2018</i> )	Unspecified	
			2,000 + 1,000 ppm spray x 1 to 3	More upright cultivars will require multiple applications ( <i>Pilon 2006</i> )	North	
		<b>Citadel/Cycocel</b>	1,250 to 1,500 ppm spray x 1 to 5	More upright cultivars will require multiple applications ( <i>Pilon 2006</i> ); 5 weekly sprays at 1,500 ppm gave good control of Blush and Rose while 4 sprays at 2-week intervals were not effective on Whirling Butterflies ( <i>Michigan State Univ.</i> )	North	
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)</b>	80 to 100 ppm spray x 1	80 ppm resulted in good growth control on Corrie's Gold, but 100 ppm gave only moderate growth control of Siskiyou Pink; Test multiple applications or higher rate; Drench applied at 2 fl. oz. per qt. pot; Volume and mg a.i. vary with pot size. Good growth control of Pink Fountain with liner soak ( <i>Virginia Tech</i> ).	South	
			15 ppm drench x 1			
			2 to 4 ppm liner soak x 1			

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION	
<b>Gaura lindheimeri</b> (White Gaura, Wand Flower, Butterflies) <i>continued</i>	To control plant growth <i>continued</i>		60 to 90 ppm spray x 4 to 5	Weekly applications of 90 ppm spray gave good control of Blush and Rose while 60 ppm sprays at 2-week intervals gave good control of Whirling Butterflies ( <i>Michigan State Univ.</i> )	North	
			20 to 30 ppm spray x 1 to 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); More upright cultivars will require multiple applications of 30 ppm sprays; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )		
			6+ ppm drench x 1			
			30 to 50 ppm spray x 1	Will control unwanted growth ( <i>Ball Hort</i> )	Unspecified	
			50 ppm spray x 1	Effective growth control ( <i>Univ. Calif.</i> )	South	
			<b>Concise/Sumagic</b>	15 to 60 ppm spray x 1	Significant cultivar differences in response: Height of Whirling Butterflies was excessively reduced by 15 ppm, but 30 ppm gave short-term growth regulation of Corrie's Gold; Dauphin was only moderately controlled by 60 ppm and Siskiyou Pink was not responsive to a 60 ppm spray ( <i>Virginia Tech</i> )	South
				10 to 20 ppm spray x 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	
				5 to 15 ppm spray x 1 to 5	One 5 ppm spray controls compact cultivars; More upright cultivars will require multiple applications; Also recommends tank mix 2,000 ppm daminozide + 5 ppm uniconazole ( <i>Pilon 2006</i> ); 5 weekly applications of 15 ppm spray stunted Blush and Rose, while two 10 ppm sprays at 2-week intervals gave good control of Whirling Butterflies without affecting flowering ( <i>Michigan State Univ.</i> )	North
				30 to 50 ppm spray x 1	Will control unwanted growth ( <i>Ball Hort</i> )	Unspecified
				Topflor	100 ppm spray x 1	Moderate height control of Corrie's Gold; Test multiple applications or higher rate ( <i>Auburn Univ.</i> )
To increase branching		<b>Configure</b>	500 to 600 ppm spray x 1 300 ppm spray x 1 to 2 on liners	Siskiyou Pink: Increased branches and shoots; Increased number of flower stalks; This was our screening rate—lower rates may be effective; For liners, single or multiple foliar sprays applied approximately 27 days after sticking (plants moderately rooted) increased lateral and basal branching with no adverse effects on rooting. Treatment of Whirling Butterflies with 500 ppm spray the day after removal of cuttings from mist increased branching of liners (3 weeks after treatment) and finished plants (8 weeks after treatment). Snow Fountain was not responsive to 600 ppm spray x 1 applied in the liner stage ( <i>Virginia Tech</i> )	Branching	
<b>Geranium Rozanne</b> (Cranesbill Geranium)	To control plant growth	<b>Dazide/B-Nine</b>	Tank mix	Apply a tank mix of 2,000 ppm daminozide with 3 ppm uniconazole as needed to control overall plant size ( <i>Walters Gardens Culture Sheet</i> )	North	
	To induce lateral branching	<b>Configure</b>	Not responsive at 600 ppm spray x 1	This rate was our screening rate. Higher rates or multiple applications may be effective ( <i>Virginia Tech</i> )	Branching	
<b>Geum</b> (Avens)	To control plant growth	<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	30 ppm spray x 1 to 3	For control of flower height, apply at 7 to 10 day intervals as stems begin to emerge from the foliage ( <i>Walters Gardens Culture Sheet</i> )	North	
		<b>Concise/Sumagic</b>	5 ppm spray x 1 to 3	For control of flower height, apply at 7 to 10 day intervals as stems begin to emerge from the foliage ( <i>Walters Gardens Culture Sheet</i> )	North	
<b>Hedera canariensis</b> (Algerian Ivy)	Induce lateral or basal branching	<b>Configure</b>	50 to 200 ppm spray x 3	Foliar spray every 2 weeks starting 2 weeks after potting increased branching ( <i>Fine Configure Guide</i> )	Branching	

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b><i>Helenium autumnale</i></b> (Sneezeweed)	To control plant growth	<b>Dazide</b> /B-Nine	2,500 ppm spray x 1	Mariachi Salsa may require higher rates in the South ( <i>Pilon 2014</i> )	North
			2,500 ppm spray x 2 to 4	For Mardi Gras, apply weekly prior to bud set ( <i>GreenLeaf Culture Sheet</i> )	Unspecified
			2,500 ppm spray x 2	Moderate height control of Coppelia ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	Not responsive at 5,000 + 1,500 ppm spray x 1	Reduced width of Coppelia but no height control ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	Not responsive to 160 ppm spray x 1	No effect on growth of Coppelia ( <i>Virginia Tech</i> )	South
		<b>Concise</b> /Sumagic	Not responsive to 60 ppm spray x 1	No effect on growth of Coppelia ( <i>Virginia Tech</i> )	South
	To induce lateral branching	<b>Configure</b>	Not responsive to 600 ppm spray x 1	This was our test rate on Coppelia; Higher rates or multiple applications may be more effective ( <i>Virginia Tech</i> )	Branching
			20 to 40 ppm spray x 3	Foliar sprays weekly in summer increased lateral branching and delayed flowering but increased flower number ( <i>Fine Configure Guide</i> )	
<b><i>Heliopsis helianthoides</i></b> (False Sunflower, Sunflower Heliopsis)	To control plant growth	<b>Dazide</b> /B-Nine	Less than 5,000 ppm spray x 2	Summer Sun was very sensitive to daminozide under nursery conditions; Test at lower rates ( <i>Virginia Tech</i> )	South
			2,500 ppm spray x 1 shortly after pinching	Tuscan Gold apply shortly after pinching if needed ( <i>Walters Gardens</i> )	Unspecified
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1	Persistent control of Summer Sun under nursery conditions; Test lower rates ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	Not responsive at 160 ppm spray x 1	Summer Sun was not responsive under nursery conditions ( <i>Virginia Tech</i> )	South
			Not responsive at 80 ppm spray x 1	Summer Green was not responsive to liner applications just prior to transplanting; Drench applied to liners at 0.3 fl. oz. per 72-size cell; Volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	
			Not responsive at 10 ppm drench x 1		
		<b>Concise</b> /Sumagic	6 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
		<b>Concise</b> /Sumagic	Not responsive at 60 ppm spray x 1	Summer Sun was not responsive under nursery conditions ( <i>Virginia Tech</i> )	South
	To increase lateral branching	<b>Configure</b>	600 ppm spray x 2	Applied at transplant and again 2 weeks after transplant doubled number of lateral branches and enhanced growth of Summer Green ( <i>Virginia Tech</i> )	South
	<b><i>Helleborus × hybridus</i></b> (Lenten Rose)	Induce lateral or basal branching	<b>Configure</b>	50 to 800 ppm spray x 1	Foliar spray applied every 2 weeks for 12 weeks during the summer; Some increase in branching; No phytotoxicity, but leaves are feathered ( <i>NC State Univ.</i> )
<b><i>Hemerocallis</i></b> (Daylily)	To control plant growth	<b>Abide</b> /A-Rest	2 ppm drench x 1	Moderate control of height of Happy Returns, but significant reduction of flower stalk height; Use care with higher rate; Applied at 10 fl. oz. per trade gal. pots; Volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	South
			50 to 100 ppm spray x 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			5+ ppm drench x 1	Applied to overwintered plants at shoot emergence; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	
		<b>Dazide</b> /B-Nine	3,750 ppm spray x 2 to 3	2 to 3 weekly spray applications of daminozide or tank mix of 3,750 daminozide + 5 ppm uniconazole ( <i>Pilon 2006</i> )	North
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	2,500 + 1,250 ppm spray x 2 to 3	Weekly spray applications ( <i>Pilon 2006</i> )	North

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Hemerocallis</i> (Daylily) <i>continued</i>	To control plant growth <i>continued</i>	<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	160 to 180 ppm spray x 1	Spray applications gave moderate height control of Mary Todd and Hyperion, but no control on Black Eyed Stella or Prairie Blue Eyes; Drench application gave moderate control of height of Happy Returns, Hyperion and Prairie Blue Eyes, but significantly reduced flower stalk height; Use care with higher rates; Applied at 10 fl. oz. per trade gal. pots; Volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	South
			2 ppm drench x 1		
			45 ppm spray x 2 to 3		
			5 to 6+ ppm drench x 1		
			50 ppm spray x 1		
		<b>Concise/Sumagic</b>	0.5 to 0.1 ppm drench x 1	Moderate control of height of Butter Pat, Sammy Russell, Happy Returns and Frankly Scarlet, but significant reduction of flower stalk height; Use care with higher rate; Applied at 10 fl. oz. per trade gal. pots; Volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	South
			5 to 10 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	North
			1.0 ppm drench x 1		
			1.0 ppm drench x 1	Drench when grown under greenhouse conditions; Drench volume and mg a.i. will vary with pot size ( <i>Walters Gardens Culture Sheet</i> )	South
			Not responsive at 60 ppm spray x 1	Bare root liners of Pink Song not responsive to uniconazole; Drench applied at 2 fl. oz. per qt. pot; Drench volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	
	Not responsive at 1 ppm drench x 1				
	Not responsive at 2 ppm liner soak x 1				
	To increase basal branching	<b>Configure</b>	Not responsive at 600 ppm spray x 1	Strutters Ball was not responsive to our screening rate of 600 ppm; Higher rates or multiple applications may be effective ( <i>Virginia Tech</i> )	Branching
			2,500 ppm spray x 1 to 3	Weekly applications increased the number of ramets (basal plantlets) ( <i>Auburn Univ.</i> )	
2,500 or 5,000 ppm spray x 1 to 5			Foliar spray for 1, 2, 3, 4, or 5 consecutive weeks increased offset formation; higher rates and more applications were generally optimal ( <i>Fine Configure Guide</i> )		
<i>Heuchera</i> (Coral Bells)	To control plant growth	<b>Abide/A-Rest</b>	100 ppm spray x 6	Good control of Bloody Mary with weekly applications ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine</b>	3,750 to 5,000 ppm spray x 2	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Good control of Bloody Mary with 6 weekly applications of 5,000 ppm ( <i>Michigan State Univ.</i> )	North
		<b>Citadel/Cycocel</b>	1,500 ppm spray x 6	Good control of Bloody Mary with weekly applications ( <i>Michigan State Univ.</i> )	North
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	Not responsive at 120 ppm spray x 1	Silver Lode not responsive ( <i>Virginia Tech</i> )	South
			30 ppm spray x 2	Spray at weekly intervals; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> ). Height of flower stems can also be reduced by applying when flower buds approach the top of the canopy, may require two weekly applications ( <i>Pilon 2015</i> )	North
			6 ppm drench x 1		
			10 to 25 ppm spray x 1	Generally not needed ( <i>Ball Culture Sheets</i> )	Unspecified

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
		<b>Concise</b> /Sumagic	5 to 15 ppm spray x 2 to 6	Spray 5 ppm at weekly intervals ( <i>Pilon 2006</i> ); Height of flower stems can also be reduced by applying when flower buds approach the top of the canopy, may require two weekly applications ( <i>Pilon 2015</i> ). Apply 5 ppm sprays early in production and 10 ppm sprays later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Excellent control of Bloody Mary with 6 weekly applications of 15 ppm spray ( <i>Michigan State Univ.</i> )	North
			2 to 4 ppm spray x 1	Generally not needed ( <i>Ball Culture Sheets</i> )	Unspecified
	To increase basal branching	<b>Configure</b>	600 ppm spray x 1	Raspberry Ice and Silver Lode increased basal branching at our screening rate; Lower rates may be effective ( <i>Virginia Tech</i> )	Branching
<b>Hibiscus moscheutos</b> (Hardy Hibiscus Rose Mallow)	To control plant growth	<b>Abide</b> /A-Rest	100 ppm spray x 5 or 6	Excellent control of Disco Belle Mix, but not effective on Luna Blush or Luna Red ( <i>Michigan State Univ.</i> )	North
		<b>Collate</b> /Florel	Less than 500 ppm spray x 4	Biweekly sprays excessively reduced growth of Pink Champagne without increasing branching; Reduce number of applications ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine	5,000 ppm spray x 5 to 6	Moderate control of Disco Belle Mix, but not effective on Luna Blush or Luna Red ( <i>Michigan State Univ.</i> )	North
			3,750 ppm spray x 6 to 8	Treat about 1 week after pinch with weekly sprays as necessary ( <i>Pilon 2006</i> )	
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	3,750 + 1,000 ppm spray x 2	For best results, begin PGR applications about 3 to 5 days following a pinch—use at 7-day intervals if additional control is needed ( <i>Walters Gardens Culture Sheet</i> ; <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	North
			2,500 + 1,250 ppm spray x 2 to 3	Treat about 1 week after pinch, weekly sprays as necessary ( <i>Pilon 2006</i> )	
			2,500 + 750 to 1,000 ppm spray x 1	For Luna, apply spray about 2 weeks after transplant and again 2 weeks later if necessary ( <i>Jolly Farmer Cultural Guide</i> )	Unspecified
			Unspecified	Dazide/B-Nine can delay flowering; Only use when Citadel/Cycocel rate must exceed 750 ppm for adequate control ( <i>GreenLeaf Technical Guide</i> )	
		<b>Citadel</b> /Cycocel	500 ppm spray x 2	Good control of Lord Baltimore with spray applications, but excessive growth reduction with 2,000 ppm drenches applied at 4 fl. oz. per 6-in. pot; Reduce drench rate; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South
			Less than 2,000 ppm drench x 1		
			750 to 1,000 ppm spray x 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Multiple sprays with 1,500 ppm caused excessive stunting of Disco Belle Mix, Luna Blush and Luna Red ( <i>Michigan State Univ.</i> )	North
			Up to 750 ppm spray x 1	Do not apply until length of new shoots (after pinch) is 0.5 to 1.0 inch; Do not apply after visible bud ( <i>GreenLeaf Technical Guide</i> )	Unspecified
		<b>Piccolo</b> / <b>Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	10 ppm spray x 6 to 8	For best results, begin PGR applications about 3 to 5 days following a pinch, use at 7-day intervals if additional control is needed ( <i>Walters Gardens Culture Sheet</i> )	North
			90 ppm spray x 5 to 6	Excessive control of Disco Belle Mix, but excellent on Luna Blush and Luna Red ( <i>Michigan State Univ.</i> )	
			45 ppm spray x 6 to 8	Treat about 1 week after pinch, one drench or weekly sprays as necessary; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> ); Apply 5 to 7.5 ppm drench after 4 to 6 inches new growth after soft pinch ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	
			5 to 7.5 ppm drench x 1		Unspecified
			50 ppm spray x 1 to 2	Apply second spray 2 weeks later if needed; Drench volume and mg a.i. will vary with pot size ( <i>OHP PGR Solutions 2011</i> )	
			5 ppm drench x 1		

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION	
<b>Hibiscus moscheutos</b> (Hardy Hibiscus Rose Mallow) <i>continued</i>	To control plant growth <i>continued</i>	<b>Concise/Sumagic</b>	10 to 20 ppm spray x 1	Good control of Grenache with 20 ppm spray; Sensitive to uniconazole drenches; Drench applied at 10 fl. oz. per trade gal. pot; Volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South	
			0.5 ppm drench x 1	Sprays at 10 to 20 ppm x 1 once resulted in good control in Florida ( <i>Univ. Florida</i> )		
			7.5 ppm spray x 6 to 8	For best results, begin PGR applications about 3 to 5 days following a pinch, use at 7-day intervals if additional control is needed ( <i>Walters Gardens Cultural Sheets</i> )	North	
			10 ppm spray x 2	Effective height control on Luna Blush; Make second application 2 to 3 weeks after first, if necessary ( <i>Louisiana State Univ.</i> )	South	
			5 to 10 ppm spray x 6 to 8	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Treat about 1 week after pinch, 1 drench or weekly 7.5 ppm sprays as necessary; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> ); Multiple applications of 15 ppm spray resulting in severe stunting of Disco Belle Mix, Luna Blush and Luna Red ( <i>Michigan State Univ.</i> )	North	
			1 ppm drench x 1			
	To increase branching	<b>Configure</b>	500 ppm spray x 4	Biweekly sprays increased branching of Pink Champagne with reduction in plant height ( <i>Michigan State Univ.</i> )	North	
<b>Hosta</b>	To control plant growth, spray when leaves begin to unfold ( <i>Pilon 2006</i> )	<b>Abide/A-Rest</b>	25 to 50 ppm spray x 2 to 3	Spray when leaves begin to unfold; Drench after first few leaves have expanded; Volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> ); Sprays of 100 ppm x 4 to 6 stunted Gold Standard and H. hyacinthia, but gave excellent control of Royal Standard ( <i>Michigan State Univ.</i> )	North	
			5 ppm drench x 1			
		<b>Collate/Florel</b>	500 ppm spray x 4	Biweekly sprays increased branching of Royal Standard with slight reduction in plant height ( <i>Michigan State Univ.</i> )	North	
		<b>Dazide/B-Nine</b>	5,000 ppm spray x 4 to 6	Good control of Royal Standard, but not effective on Gold Standard ( <i>Michigan State Univ.</i> )	North	
			Tank Mix	2,500 ppm daminozide + 5 ppm uniconazole spray effective; Multiple applications may be needed at 7-day intervals on larger varieties or under warm greenhouse conditions ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> ; <i>Pilon 2005</i> ); H. undulata is more sensitive, reduce rates to 2,000 ppm daminozide + 3 ppm uniconazole ( <i>Pilon 2005</i> )		
			3,000 + 1,500 ppm spray x 4 to 6	Good control of Royal Standard ( <i>Michigan State Univ.</i> )		
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	6 to 10 ppm drench x 1	Effective growth control; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> ; <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	North	
			90 ppm spray x 4 to 6	Sprays stunted H. hyacinthia, but had no effect on Gold Standard or Royal Standard ( <i>Michigan State Univ.</i> )		
			30 ppm spray x 1 to 3	Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified	
			6 ppm drench x 1			
		<b>Concise/Sumagic</b>	5 to 15 ppm spray x 2 to 3 or 1 ppm drench x 1	15 ppm x 4 to 6 applications gave good control of H. hyacinthia, Gold Standard and Royal Standard ( <i>Michigan State Univ.</i> ); H. undulata is more sensitive, reduce spray rates to 5 ppm uniconazole; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2005</i> )	North	
			20 ppm spray x 1	Single application early in production ( <i>Oklahoma grower, Sumagic Advisor 2004</i> )	South	
		To increase basal branching	<b>Configure</b>	500 to 3,000 ppm spray x 1 to 2	See Configure Product Information guide for detailed application instructions and cultivar responses ( <i>Fine Americas 2010</i> )	Branching
				500 ppm spray x 4	Biweekly sprays increased branching of Royal Standard with little reduction in plant height ( <i>Michigan State Univ.</i> )	Branching

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION		
<b><i>Hypericum calycinum</i></b> (Aaron's Beard, St. John's Wort)	To control plant growth	<b>Dazide</b> /B-Nine	Not responsive at 5,000 ppm spray x 2	Not responsive in nursery trials ( <i>Virginia Tech</i> )	South		
			2,500 ppm spray x 2 to 3	( <i>Pilon 2005</i> )	North		
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	Not responsive at 5,000 + 1,500 ppm spray x 1	Not responsive in nursery trials ( <i>Virginia Tech</i> )	South		
			2,500 + 1,000 ppm spray x 2 to 3	Weekly applications ( <i>Pilon 2005</i> )	North		
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	120 to 160 ppm spray x 1 4 ppm drench x 1	Moderate control with a single spray application under greenhouse conditions; Not responsive in nursery trials; Excellent control with 4 ppm drench at 10 fl. oz. per trade gallon pot under greenhouse conditions; Drench volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South		
			30 ppm spray x 2 to 3	Weekly applications ( <i>Pilon 2005</i> )	North		
		<b>Concise</b> /Sumagic	30 ppm spray x 1 1 ppm drench x 1	Good growth regulation; Drench applied at 10 fl. oz. per trade gallon pot; Drench volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South		
			5 ppm spray x 2 to 3	Weekly applications ( <i>Pilon 2005</i> )	North		
		<b><i>Iris germanica</i></b> <b><i>Iris hybrids</i></b> (Tall Bearded Iris)	To control plant growth	<b>Abide</b> /A-Rest	Not responsive at 100 ppm spray x 6	Weekly sprays had no effect on Immortality ( <i>Michigan State Univ.</i> )	North
				<b>Dazide</b> /B-Nine	Not responsive at 5,000 ppm spray x 6	Weekly sprays had no effect on Immortality ( <i>Michigan State Univ.</i> )	North
<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	Not responsive at 5,000 + 1,500 ppm spray x 6			Weekly sprays had no effect on Immortality ( <i>Michigan State Univ.</i> )	North		
<b>Citadel</b> /Cycocel	Not responsive at 1,500 ppm spray x 6			Weekly sprays had no effect on Immortality ( <i>Michigan State Univ.</i> )	North		
<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	90 ppm spray x 6			Weekly sprays gave good control of Immortality ( <i>Michigan State Univ.</i> )	North		
	6 to 10 ppm drench x 1			Not very responsive to spray applications; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )			
<b>Concise</b> /Sumagic	Not responsive at 15 ppm spray x 6		Weekly sprays had no effect on Immortality ( <i>Michigan State Univ.</i> )	North			
To increase basal branching	<b>Configure</b>	100 ppm spray x 1	Slight increase in basal branching ( <i>Miss. State Univ.</i> )	Branching			
<b><i>Iris siberica</i></b> (Siberian Iris)	To control plant growth	<b>Dazide</b> /B-Nine	Tank mix	2 to 3 weekly applications of tank mix of 2,500 ppm daminozide + 5 ppm uniconazole ( <i>Pilon 2005</i> )	North		
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	90 ppm spray x 1	A single spray controlled growth of Caesar's Brother, but 180 ppm spray x 1 did not control Chilled Wine; Use lower drench rates on Caesar's Brother and higher rates on Chilled Wine; Drench applied at 10 fl. oz. per trade gal. pot; Drench volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	South		
			Less than 2 to 4 ppm drench x 1				
<b><i>Jovibarba hirta</i></b> (Hens and Chicks)	Induce lateral or basal branching	<b>Configure</b>	1,600 ppm spray x 1	Increased number of offsets ( <i>Fine Configure Guide</i> )	Branching		
<b><i>Kniphofia uvaria</i></b> (Torch lily, Red hot poker)	To control plant growth	<b>Dazide</b> /B-Nine	Not responsive at 5,000 ppm spray x 2	Bressingham Comet not responsive ( <i>Virginia Tech</i> )	South		
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	Not responsive at 160 ppm spray x 1	Bressingham Comet not responsive ( <i>Virginia Tech</i> )	South		
			30 to 45 ppm spray x 1	Echo series: Multiple applications required to obtain adequate height control ( <i>Pilon 2013</i> )	North		
		<b>Concise</b> /Sumagic	45 ppm spray x 1	Bressingham Comet good control ( <i>Virginia Tech</i> )	South		
			5 to 7.5 ppm spray x 1	Echo series: Multiple applications required to obtain adequate height control ( <i>Pilon 2013</i> )	North		

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Lamium galeobdolon</b> (Yellow Archangel, Golden Dead Nettle)	To control plant growth	<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Excellent control of Hermann's Pride runners. Apply at 10-14 day intervals ( <i>Virginia Tech</i> ).	South
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	2,500 + 1,500 ppm spray x 1	Excellent control of Hermann's Pride runners ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	80 ppm spray x 1	Moderate width control of Hermann's Pride ( <i>Virginia Tech</i> )	South
		<b>Concise</b> /Sumagic	15 ppm spray x 1	Moderate width control of Hermann's Pride ( <i>Virginia Tech</i> )	South
		Topflor	45 ppm spray x 1	Moderate width control of Hermann's Pride. May need multiple applications ( <i>Virginia Tech</i> )	South
<b>Lamium maculatum</b> (Spotted Dead Nettle)	To control plant growth	<b>Abide</b> /A-Rest	50 ppm spray x 2 to 3	Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			Less than 100 ppm spray x 4	Excessive width reduction of Orchid Frost with 4 sprays at 2-week intervals; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	
		<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Moderate control of Pink Pewter, but no control of Beacon Silver under nursery conditions ( <i>Virginia Tech</i> )	South
			5,000 ppm spray x 4	Good width reduction of Orchid Frost with 4 sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			2,500 ppm spray x 2 to 3	Begin applications when canopy starts to close ( <i>Pilon 2006</i> )	
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1	Moderate control of Pink Pewter; Multiple applications may be required; No control of Beacon Silver under nursery conditions ( <i>Virginia Tech</i> )	South
			Not responsive at 3,000 + 1,500 ppm spray x 4	No control of width of Orchid Frost with 4 sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		<b>Citadel</b> /Cycocel	750 ppm spray x 2 to 3	Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			1,250 to 1,500 ppm spray x 2 to 3	Good width reduction of Orchid Frost with 1,500 ppm sprays x 4 at 2-week intervals ( <i>Michigan State Univ.</i> )	
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	40 ppm spray x 1	Good control of Pink Pewter, but multiple applications may be necessary; No control of Beacon Silver with 160 ppm spray x 1 under nursery conditions ( <i>Virginia Tech</i> )	South
			30 to 60 ppm spray x 2 to 3	Lower rate recommended at weekly intervals ( <i>Pilon 2006</i> ); Good width reduction of Orchid Frost with 60 ppm sprays x 4 at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			30 ppm spray x 1 to 3 3 ppm drench x 1	Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified
		<b>Concise</b> /Sumagic	30 ppm spray x 1	Moderate control of Pink Pewter; Multiple applications may be required; No control of Beacon Silver with 60 ppm x 1 under nursery conditions ( <i>Virginia Tech</i> )	South
			5 to 15 ppm spray x 2 to 3	Lower rate rec ( <i>Pilon 2006</i> ) Excellent width reduction of Orchid Frost with 15 ppm sprays x 4 at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		<b>Lantana camara</b>	To control plant growth	<b>Collate</b> /Florel	Not responsive at 500 ppm spray x 1 on liners
<b>Dazide</b> /B-Nine	2,500 ppm spray x 1 on liners			No effect on growth or branching of liners or finished plants of Dallas Red or New Gold ( <i>Virginia Tech</i> )	South
<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	40 to 50 ppm spray x 1			Moderate growth control ( <i>Fine 2012</i> )	Unspecified
	4 to 8 ppm liner soak x 1				
<b>Concise</b> /Sumagic	20 to 30 ppm spray x 1			Moderate growth control ( <i>Fine 2012</i> )	Unspecified

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Lavandula angustifolia</b> (Lavender)	To control plant growth	<b>Abide/A-Rest</b>	25 ppm spray x 2 to 3	Weekly applications as necessary ( <i>Pilon 2006</i> )	North
		<b>Dazide/B-Nine</b>	5,000 ppm spray x 1	Moderate control of Provence applied once in liner stage ( <i>Virginia Tech</i> )	South
			2,000 to 3,000 ppm spray x 1	Ellegance or Mini Blue, multiple applications may be required ( <i>PanAmerican Seed, 2018</i> )	Unspecified
			2,500 ppm spray x 2	Weekly applications as necessary ( <i>Pilon 2006</i> )	North
			3,750 to 5,000 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	30 ppm spray x 2	Weekly applications as necessary; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2006</i> )	North
			6 ppm drench x 1		
			15 ppm spray x 1	For Blue Scent ( <i>Syngenta Culture Sheets</i> )	Unspecified
		<b>Concise/Sumagic</b>	5 to 10 ppm spray x 1 to 3	Apply to Hidcote Blue or Munstead as needed ( <i>Ball Hort</i> )	Unspecified
			15 to 30 ppm spray x 1	For control of flower stalk height on Phenomenal, apply when flower stalk reaches the top of the foliage. Higher rate delayed flower opening by 5 days ( <i>Virginia Tech</i> )	South
			5 to 10 ppm spray x 2	Weekly applications at 5 ppm as necessary ( <i>Pilon 2006</i> ); Sweet Romance may need 5 ppm spray x 1 for compact growth ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	North
				Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	
<b>Lavandula x intermedia</b> (Lavandin)	To control plant growth	<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	Good control of Silver Edge (Walvera); Apply at 10- to 14-day intervals ( <i>Virginia Tech</i> )	South
			2,500 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Good control of Silver Edge ( <i>Walvera; Virginia Tech</i> )	South
			2,500 + 1,000 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	Not responsive at 160 ppm spray x 1	Silver Edge (Walvera) not responsive ( <i>Virginia Tech</i> )	South
			30 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		<b>Concise/Sumagic</b>	Not responsive at 60 ppm spray x 1	Silver Edge (Walvera) not responsive to 60 ppm spray x 1 ( <i>Virginia Tech</i> )	South
	5 ppm spray x 2 to 3		Weekly sprays ( <i>Pilon 2005</i> )	North	
	To increase lateral branching of liners	<b>Configure</b>	300 ppm spray x 2 for liners	2 foliar sprays applied to Provence, first at approximately 34 days after sticking and again 2 weeks later; Increased lateral and basal branching with slight reduction in root growth; Apply after liners are well rooted ( <i>Virginia Tech</i> )	Branching
	<b>Leucanthemum x superbum</b> (Shasta Daisy)	To control plant growth	<b>Abide/A-Rest</b>	25 ppm spray x 2 to 3	Weekly sprays as necessary; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> ); Excessive reductions in growth of Becky with 100 ppm spray x 6 ( <i>Michigan State Univ.</i> )
5 ppm drench x 1					
<b>Collate/Florel</b>			750 ppm spray x 4	Weekly sprays reduced growth of Ice Star while increasing the number of inflorescences. Biweekly sprays of 500 ppm x 3 gave moderate growth control of Thomas Killen, but reduced number of inflorescences per shoot and number of shoots per pot ( <i>Michigan State Univ.</i> )	North

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Leucanthemum x superbum</i> (Shasta Daisy) <i>continued</i>	To control plant growth <i>continued</i>	Dazide/B-Nine	Not responsive at 5,000 ppm spray x 2	Alaska and Becky not responsive ( <i>Univ. Georgia</i> )	South
			5,000 ppm spray x 4 to 6	Good control of Becky and Ice Star with weekly sprays ( <i>Michigan State Univ.</i> )	North
			2,500 ppm spray x 1 to 2	Amazing Daisies as needed ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	
			Tank mix	Use 1 to 2 spray applications of tank mix 2,500 ppm daminozide + 15 ppm paclobutrazol or 2,000 ppm daminozide + 3 ppm uniconazole ( <i>Pilon 2006</i> )	
		Dazide/B-Nine + Citadel/Cycocel Tank Mix	Not responsive at 5,000 + 1,500 ppm spray x 1	Becky not responsive; Test increased daminozide rate ( <i>Univ. Georgia</i> )	South
		Citadel/Cycocel	Not responsive at 4,000 ppm spray x 1	Becky not responsive ( <i>Univ. Georgia</i> )	South
			1,500 ppm spray x 4 to 6	Good control of Becky and Ice Star with weekly sprays ( <i>Michigan State Univ.</i> )	North
		Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)	Less than 40 ppm spray x 1	Alaska is sensitive to paclobutrazol; Test rates below 40 ppm ( <i>Univ. Georgia</i> ); Becky had a moderate, short-term response to 120 ppm spray x 1; Multiple applications or higher rates required ( <i>Virginia Tech</i> )	South
			10 to 20 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			30 ppm spray x 1 to 2	Weekly sprays as necessary; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	
	6 ppm drench x 1		Excessive reductions in growth of Becky and Ice Star with 90 ppm spray x 6 ( <i>Michigan State Univ.</i> )		
	To control plant growth	Concise/Sumagic	Less than 15 ppm spray x 1	Alaska is sensitive to uniconazole; Test rates below 15 ppm ( <i>Univ. Georgia</i> ); Becky was not responsive to 60 ppm spray x 1; Multiple applications or higher rates required ( <i>Virginia Tech</i> )	South
			10 to 20 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			5 ppm spray x 1 to 2	Amazing Daisies, spray as necessary ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> ); Weekly sprays as necessary ( <i>Pilon 2006</i> ); Excessive reductions in growth of Becky and Ice Star with 15 ppm spray x 6 ( <i>Michigan State Univ.</i> )	
		Topflor	6 ppm drench x 1	Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	North
	To increase basal branching	Configure	300 ppm spray x 1 to 2 for liners	Single or multiple foliar sprays applied approximately 27 days after sticking (plants moderately rooted) increased basal branching of Snowcap, but slightly reduced root growth; Apply after liners are well rooted; Applied to finish plants, increased branching of Becky and Alaska short term, but doubled the number of flowers of Alaska; 600 ppm was our screening rate; Higher rates or multiple applications may be more effective ( <i>Virginia Tech</i> )	Branching
			600 ppm spray x 1 to 2 on finished plants		
<i>Liatris spicata</i> (Spike Gayfeather)	To control plant growth	Abide/A-Rest	50 ppm spray x 2 to 3	Weekly applications ( <i>Pilon 2005</i> )	North
			Excessive reductions in growth of Kobold Blue with 100 ppm spray x 6 ( <i>Michigan State Univ.</i> )		
		Collate/Florel	Not responsive at 500 to 1,000 ppm spray x 1 to 3	Biweekly sprays had no effect on Kobold ( <i>Michigan State Univ.</i> )	North
		Dazide/B-Nine	3,750 ppm spray x 2 to 3	Weekly applications ( <i>Pilon 2005</i> ); Kobold Blue not responsive to 5,000 ppm sprays x 6 weekly ( <i>Michigan State Univ.</i> )	North
			Tank mix	Use 2,500 ppm daminozide + 5 ppm uniconazole spray x 2 to 3 ( <i>Pilon 2005</i> )	
		Citadel/Cycocel	Not responsive at 1,500 ppm spray x 6	Kobold Blue not responsive to weekly applications ( <i>Michigan State Univ.</i> )	North

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	Not responsive at 160 ppm spray x 1	Floristan Violet not responsive ( <i>Virginia Tech</i> )	South
			90 ppm spray x 6	Weekly applications gave good control of Kobold Blue ( <i>Michigan State Univ.</i> )	North
		<b>Concise</b> /Sumagic	Not responsive at 60 ppm spray x 1	Floristan Violet not responsive ( <i>Virginia Tech</i> )	South
			15 ppm spray x 6	Weekly applications gave good control of Kobold Blue ( <i>Michigan State Univ.</i> )	North
<b>Lobelia cardinalis</b> (Cardinal flower)	To control plant growth	<b>Abide</b> /A-Rest	25 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> ); Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	North
			5 ppm drench x 1		
		<b>Dazide</b> /B-Nine	Not responsive at 5,000 ppm spray x 2	Not responsive ( <i>Virginia Tech</i> )	South
			3,750 to 5,000 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			2,500 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2015</i> )	
			Tank mix	Good height control with 2 to 3 weekly applications of a tank mix of 3 ppm uniconazole + 2,000 ppm daminozide ( <i>Pilon 2014</i> )	
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	Not responsive at 5,000 + 4,000 ppm spray x 1	Not responsive ( <i>Virginia Tech</i> )	South
			2,500 + 1,000 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		<b>Citadel</b> /Cycocel	1,250 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	Not responsive at 60 ppm spray x 1	Not responsive ( <i>Virginia Tech</i> )	South
			30 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> ); Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	North
			6 ppm drench x 1		
		<b>Concise</b> /Sumagic	30 ppm spray x 1	Good control ( <i>Virginia Tech</i> )	South
	5 ppm spray x 2 to 3		Weekly sprays ( <i>Pilon 2005</i> ); Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	North	
1 ppm drench x 1					
Topflor	6 ppm drench x 1	Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	North		
	To increase lateral branching	<b>Configure</b>	600 ppm spray x 1	This rate was our screening rate; Lower rates may be effective ( <i>Virginia Tech</i> )	Branching
<b>Lobelia x speciosa</b> (Hybrid Lobelia)	To control plant growth	<b>Abide</b> /A-Rest	50 to 100 ppm spray x 2 to 3	Apply lower spray rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			25 to 50 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> ); 25 ppm x 2 to 3 applications at 7-day intervals ( <i>Walters Gardens Culture Sheet</i> )	
		<b>Dazide</b> /B-Nine	3,750 to 5,000 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
			2,500 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> ; <i>Walters Gardens Culture Sheet</i> )	
		<b>Citadel</b> /Cycocel	1,250 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
			1,500 ppm spray x 3	Label rate: Compliment Scarlet and Queen Victoria ( <i>Cycoce</i> )	Unspecified
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	120 ppm spray x 1	Fan Deep Rose had moderate response; Multiple applications required ( <i>Virginia Tech</i> )	South
			30 ppm spray x 1	Starship series and Vulcan Red, multiple sprays may be required ( <i>PanAmerican Seed, 2018</i> )	Unspecified

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Lobelia x speciosa</b> (Hybrid Lobelia) <i>continued</i>	To control plant growth <i>continued</i>	<b>Concise</b> /Sumagic	5 to 10 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Weekly sprays at 5 ppm ( <i>Pilon 2005</i> ; <i>Walters Gardens Culture Sheet</i> ); Starship series and Vulcan Red, 5 ppm sprays as needed ( <i>PanAmerican Seed, 2018</i> )	North
	To increase lateral branching	<b>Configure</b>	600 ppm spray x 1	Increased number of shoots, not branches, on Fan Deep Rose; Moderate response; This rate was our screening rate; Higher rates may be more effective ( <i>Virginia Tech</i> )	Branching
<b>Lysimachia</b> (Loosestrife)	To control plant growth	<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Moderate control of Snow Candles. Apply at 10- to 14-day intervals ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	2,500 + 1,500 ppm spray x 1	Moderate control of height and width of Snow Candles ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	120 ppm spray x 1	Moderate height and width control of Snow Candles ( <i>Virginia Tech</i> )	South
		Topflor	30 ppm spray x 1	Moderate height and width control ( <i>Virginia Tech</i> )	South
<b>Malva alcea</b> (Hollyhock Malva)	To control plant growth	<b>Dazide</b> /B-Nine	Not responsive to 5,000 ppm spray x 2	Not responsive ( <i>Univ. Georgia</i> )	South
		<b>Citadel</b> /Cycocel	750 to 1,500 ppm spray x 1	Not responsive ( <i>Univ. Georgia</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	Much less than 40 ppm spray x 1	Very sensitive; Test rates around 10 to 20 ppm ( <i>Univ. Georgia</i> )	South
			15 ppm spray x 1	Effective at controlling plant height when applied early in the crop ( <i>Walters Gardens Culture Sheet</i> )	North
		<b>Concise</b> /Sumagic	Much less than 15 ppm spray x 1	Very sensitive; Test rates around 2 to 5 ppm ( <i>Univ. Georgia</i> )	South
			2.5 ppm spray x 1	Effective at controlling plant height when applied early in the crop ( <i>Walters Gardens Culture Sheet</i> )	North
<b>Miscanthus sinensis</b> (Maiden grass)	To control plant growth	<b>Citadel</b> /Cycocel	1,500 ppm spray x 4	Weekly sprays reduced plant height moderately ( <i>Michigan State Univ.</i> )	North
		<b>Collate</b> /Florel	750 ppm spray x 4	Weekly sprays reduced plant height and increased number of tillers ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine	Not responsive at 5,000 ppm spray x 2	Gracillimus not responsive ( <i>Virginia Tech</i> )	South
			5,000 ppm spray x 4	Weekly sprays reduced plant height moderately ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	Not responsive at 5,000 + 1,500 ppm spray x 2	Gracillimus not responsive ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	Not responsive at 160 ppm spray x 1	Gracillimus not responsive ( <i>Virginia Tech</i> )	South
			10 ppm drench x 1	Apply when plants are 10 to 12 inches tall; drench volume and mg a.i. will vary with pot size ( <i>Walters Gardens Culture Sheet</i> )	North
		<b>Concise</b> /Sumagic	Not responsive at 60 ppm spray x 1	Gracillimus not responsive to sprays, but very responsive to liner soaks ( <i>Virginia Tech</i> )	South
			2 ppm liner soak x 1		
			40 ppm spray x 1	Moderate height control of Gracillimus only at 2 weeks after treatment; Multiple applications may provide control ( <i>Univ. Florida</i> )	North
			15 ppm spray x 4	Excessive growth regulation with weekly sprays; Reduce spray frequency ( <i>Michigan State Univ.</i> )	
		2 ppm drench x 1	Apply when plants are 10 to 12 inches tall; drench volume and mg a.i. will vary with pot size ( <i>Walters Gardens Culture Sheet</i> )	North	
Topflor	Not responsive at 120 ppm spray x 1	Gracillimus not responsive ( <i>Virginia Tech</i> )	South		
	10 ppm drench x 1	Apply when plants are 10- to 12-in. tall; drench volume and mg a.i. will vary with pot size ( <i>Walters Gardens Culture Sheet</i> )	North		

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
	To increase tillering	<b>Configure</b>	Not responsive 500 or 1,000 ppm spray x 1	Gracillimus not responsive ( <i>Univ. Florida</i> )	Branching
<b>Monarda didyma</b> (Bee Balm)	To control plant growth	<b>Abide/A-Rest</b>	25 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
			1 to 2 ppm drench x 1	Drench volume and mg a.i. vary with pot size ( <i>SePro Specific Species and Application Rates</i> )	Unspecified
		<b>Collate/Florel</b>	500 ppm spray x 2	Good growth control of Gardenview Scarlet; No flower data ( <i>Virginia Tech</i> )	South
			500 ppm spray x 3	Bweekly sprays gave moderate growth control of Blue Stocking with slight delay in flowering and moderate reduction in the number of inflorescences; No effect on branching. Four biweekly sprays at 500 ppm caused excessive growth reduction of Marshall's Delight and delayed flowering ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine</b>	5,000 ppm spray x 2 to 3	Good control of Mahogany, Marshall's Delight and Raspberry Wine, but no control of Blue Stocking ( <i>Virginia Tech, Univ. Georgia</i> )	South
			2,500 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> ); Also recommends tank mix 2,000 ppm daminozide + 3 ppm uniconazole ( <i>Pilon 2005; Walters Gardens Culture Sheet</i> ); Marshall's Delight not responsive at 5,000 ppm spray x 4 at 2 week intervals ( <i>Michigan State Univ.</i> )	North
		<b>Citadel/Cycocel</b>	Not responsive at 4,000 ppm spray x 1	Blue Stocking not responsive ( <i>Univ. Georgia</i> )	South
			1,500 ppm spray x 4	Excellent control of Marshall's Delight with sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Good control of Mahogany and Marshall's Delight; Multiple applications may be required ( <i>Virginia Tech</i> )	South
			2,500 + 1,000 ppm spray x 2 to 3	Weekly applications ( <i>Pilon 2005</i> )	North
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)</b>	100 ppm spray x 1	Good control of Raspberry Wine, but no control of Blue Stocking, Jacob Kline or Mahogany with 160 ppm spray x 1 ( <i>Virginia Tech, Univ. Georgia</i> ); Good control of Raspberry Wine with 6 ppm drench x 1 applied as 2 fl. oz. per qt. pot. Moderate control of Jacob Kline with 8 ppm drench x 1 applied as 10 fl. oz. per trade gal. pot, but reduced the number of flowers. Drench volume and mg a.i. vary with pot size; Good but short-term control of Raspberry Wine with liner soak at 16 ppm ( <i>Virginia Tech</i> )	South
			6 ppm drench x 1		
			16 ppm liner soak x 1	Weekly 30 ppm sprays ( <i>Pilon 2005</i> ); Excellent control of Marshall's Delight with 60 ppm sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			30 to 60 ppm spray x 2 to 4		
			45 ppm spray x 1 to 3	Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified
			6 ppm drench x 1		
		<b>Concise/Sumagic</b>	15 to 30 ppm spray x 1	Good control of Mahogany, Marshall's Delight, Blue Stocking and Jacob Cline; Drench applied to Jacob Cline at 4 fl. oz. per qt. pot; Drench volume and mg a.i. vary with pot size ( <i>Virginia Tech, Univ. Georgia</i> )	South
			1 ppm drench x 1		
			5 to 15 ppm sprays x 2 to 4	Weekly sprays at 5 ppm ( <i>Pilon 2005</i> ); Excessive control of Marshall's Delight with 4 applications of 15 ppm sprays at 2-week intervals; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	North
			15 to 30 ppm spray x 1	Multiple applications of lower rate may be applied as necessary ( <i>Label</i> )	Unspecified
Topflor	Less than 37 ppm spray x 1		Excessive control of Jacob Cline ( <i>Virginia Tech</i> )	South	
<b>Muhlenbergia capillaris</b> (Pink Muhlygrass)	To control plant growth	<b>Concise/Sumagic</b>	40 ppm spray x 1	Early control of growth; Multiple applications may be required ( <i>Univ. Florida</i> )	South
	To increase tillering	<b>Configure</b>	Not responsive at 500 or 1,000 ppm spray x 1	Small early increase in number of tillers that did not persist after 2 weeks after treatment ( <i>Univ. Florida</i> )	Branching

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Nepeta x faassenii</i> (Catmint)	To control plant growth	Abide/A-Rest	25 ppm spray x 2 to 3	Weekly applications ( <i>Pilon 2005</i> )	North
		Dazide/B-Nine	2,500 to 5,000 ppm spray x 5	Weekly applications at 2,500 ppm; Also recommends tank mix 2,000 ppm daminozide + 3 ppm uniconazole ( <i>Pilon 2005</i> ) 5 weekly sprays of 5,000 ppm gave good control of Walker's Low ( <i>Michigan State Univ.</i> )	North
		Citadel/Cycocel	1,500 ppm spray x 5	Weekly applications gave good control of Walker's Low ( <i>Michigan State Univ.</i> )	North
		Dazide/B-Nine + Citadel/Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1	Good control of Six Hills Giant; Multiple applications may be required ( <i>Virginia Tech</i> )	South
			2,500 + 1,000 ppm spray x 3	Excellent control of Six Hills Giant ( <i>Pilon, GPN 2002</i> )	North
		Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)	15 ppm spray x 1	For Walker's Low, single application at 3 weeks after planting gave good control ( <i>Virginia grower</i> )	South
			Not responsive at 100 ppm spray x 2	For Walker's Low: Sprays at 1 and 3 weeks after planting gave little control; Good control with drench of 4 fl. oz. per 5.5-in. pot at 1 week after planting; Drench volume and mg a.i. affected by pot size; Higher drench rates resulted in leaf necrosis; Liner soak gave only 3 weeks control; Test higher rate ( <i>Michigan State Univ.</i> )	North
	5 ppm drench x 1				
	Greater than 20 ppm liner soak x 1				
	30 ppm spray x 2 to 3	For Walker's Low, repeat at 7- to 10-day intervals beginning when plants are 4- to 6- in. high ( <i>Pilon, GPN 2007</i> )	Unspecified		
	30 ppm spray x 1 to 3	Kitten Around apply at 7 to 10 day intervals beginning when the plants are 4-6 inches high ( <i>Walters Gardens</i> ); Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )			
	To control plant growth	Concise/Sumagic	5 to 15 ppm spray x 1 to 3	For Walker's Low, a single spray of 15 ppm at 8 days after planting or 2 sprays of 10 ppm (at 1 and 3 weeks after planting) gave excellent control ( <i>Michigan State Univ.</i> ) For Walker's Low, repeat 5 ppm sprays x 3 at 7- to 10-day intervals beginning when plants are 4- to 6-in. high ( <i>Pilon, GPN 2007</i> )	North
			5 ppm spray x 2 to 3	Begin application when plants are 4 to 6 inches tall; apply as needed at 7 to 10 day intervals ( <i>Walters Gardens Culture Sheet</i> )	
To increase lateral branching	Configure	600 ppm spray x 1 to 2 on liners	Applied once at 5 days after transplant or twice at plug stage (7 days after sticking) and at 5 days after transplant; Increased number of lateral branches (75%); Slight reduction in plant growth ( <i>Virginia Tech</i> )	Branching	
<i>Oenothera fruticosa youngii</i> (Sundrops)	To control plant growth	Concise/Sumagic	5 to 10 ppm spray x 1	If necessary, uniconazole is effective ( <i>Walters Gardens Culture Sheet</i> )	North
	To increase lateral branching	Configure	Not responsive to 50 to 1,600 ppm spray x 1	Not responsive to single spray applied 2 weeks after potting ( <i>Fine Configure Guide</i> )	Branching
<i>Opuntia microdasys</i> (Pricklypear cactus)	Induce lateral branching	Configure	Not responsive to 100 to 200 ppm spray x 1	Not responsive ( <i>Fine Configure Guide</i> )	Branching
<i>Paeonia</i> (Peony)	To control plant growth	Concise/Sumagic	10 to 20 ppm drench x 1	Drench applied in spring prior to shoot emergence resulted in moderate height control but may have reduced flowering (ongoing research); Drench volume and mg a.i. affected by pot size. Spring growth was not responsive to spraches applied the previous fall ( <i>Virginia Tech</i> )	South
			Not responsive at 10 to 20 ppm sprench x 1 (4x volume)		
	Induce basal branching	Configure	100 to 1,600 ppm root soak x 1	BA applied as a 5-minute pre-plant soak of peony root divisions in the fall, caused buds to sprout about 20 days earlier and over a shorter time period; 400 ppm optimal ( <i>NC State Univ.</i> )	Branching
			Not responsive at 250 or 500 ppm root soak x 1	Not responsive to 2-min pre-plant soaks of divisions in the fall ( <i>Virginia Tech</i> )	Branching

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b><i>Panicum virgatum</i></b> (Switchgrass)	To control plant growth	<b>Abide</b> /A-Rest	Not responsive at 100 ppm spray x 4	Biweekly sprays caused little growth control of Heavy Metal ( <i>Michigan State Univ.</i> )	North
		<b>Collate</b> /Florel	Not responsive at 500 ppm spray x 4	Biweekly sprays had no effect plant height of Heavy Metal, but plants were thinner ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine	Not responsive 5,000 ppm spray x 2	Shenandoah not responsive ( <i>Virginia Tech</i> )	South
			5,000 ppm spray x 4	Little effect of biweekly sprays on Heavy Metal ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 2	Shenandoah moderate response to biweekly sprays ( <i>Virginia Tech</i> )	South
			Not responsive at 3,000 + 1,500 ppm spray x 4	Biweekly sprays had no effect on height of Heavy Metal ( <i>Michigan State Univ.</i> )	North
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	80 ppm spray x 1	Shenandoah moderate response ( <i>Virginia Tech</i> )	South
			Less than 60 ppm spray x 4 12 to 18 ppm drench x 1	Biweekly sprays caused excessive growth reduction of Heavy Metal with little height control; Plants were very thin; Reduce frequency of application ( <i>Michigan State Univ.</i> ). Drenches are more effective; Drench volume and mg a.i. affected by pot size ( <i>Pilon 2012</i> )	North
			5 ppm drench x 1	Apache Rose and Cheyenne Sky ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	
		<b>Concise</b> /Sumagic	Not responsive at 60 ppm spray x 1	Shenandoah not responsive ( <i>Virginia Tech</i> )	South
			15 ppm spray x 4 1 to 2 ppm drench x 1	Biweekly sprays caused excessive growth reduction of Heavy Metal with little height control; Plants were very thin; Reduce frequency of application ( <i>Michigan State Univ.</i> ). Drenches are more effective; Drench volume and mg a.i. affected by pot size ( <i>Pilon 2012</i> ); Apache Rose and Cheyenne Sky, apply 1 ppm drench x 1 ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	North
			60 ppm spray x 1 10 to 15 ppm drench x 1	Shenandoah moderate response ( <i>Virginia Tech</i> ) Drenches are more effective; Drench volume and mg a.i. affected by pot size ( <i>Pilon 2012</i> )	South North
	Topflor	60 ppm spray x 1	Shenandoah moderate response ( <i>Virginia Tech</i> )	South	
10 to 15 ppm drench x 1		Drenches are more effective; Drench volume and mg a.i. affected by pot size ( <i>Pilon 2012</i> )	North		
To increase tillering	<b>Configure</b>	Not responsive at 500 ppm spray x 4	Heavy Metal not responsive to biweekly sprays; Plants much thinner than untreated ( <i>Michigan State Univ.</i> )	Branching	
<b><i>Papaver orientale</i></b> (Oriental Poppy)	To control plant growth	<b>Dazide</b> /B-Nine	2,500 ppm spray x 2 to 3	Weekly sprays; Also recommends tank mix of 2,000 ppm daminozide + 3 ppm uniconazole ( <i>Pilon 2005</i> ).	North
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	160 ppm spray x 1	Growth reduction of Royal Wedding was moderate and short term; Princess Victoria was not responsive under nursery conditions ( <i>Virginia Tech</i> )	South
		<b>Concise</b> /Sumagic	30 to 45 ppm spray x 1	Growth reduction of Royal Wedding and Princess Victoria was moderate under nursery conditions ( <i>Virginia Tech</i> )	South
<b><i>Penstemon barbatus</i></b> (Beardlip Penstemon, Bearded Tongue)  <b><i>Penstemon digitalis</i></b> <b><i>Penstemon x mexicali hybrids</i></b>	To control plant growth	<b>Collate</b> /Florel	500 ppm spray x 1	Moderate control of plant height, increased branching but delayed flowering by 7 days for Pike's Peak Purple ( <i>Virginia Tech</i> )	South
			2,500 ppm spray x 1	For Pinacolada ( <i>Syngenta Culture Sheets</i> )	Unspecified
		<b>Dazide</b> /B-Nine	1,500 to 2,500 ppm spray x 1	Effective on Husker Red or Firebird ( <i>Ball Hort</i> ); Carillo series ( <i>PanAmerican Seed, 2018</i> )	Unspecified
			5,000 ppm spray x 1	Moderate height control of Pike's Peak Purple, but reduced flowering ( <i>Virginia Tech</i> )	South
			2,500 ppm spray x 1 to 3	Pensham Laura or Red Riding Hood may require multiple applications ( <i>Pilon 2012</i> ); Effective on Midnight Masquerade ( <i>Walters Gardens Culture Sheet</i> )	North
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	2,500 + 1,000 ppm spray x 2	Multiple applications required for hybrids ( <i>Fischer</i> )	Unspecified

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION	
<b><i>Penstemon barbatus</i></b> (Beardlip Penstemon, Bearded Tongue)  <b><i>Penstemon digitalis</i></b> <b><i>Penstemon x mexicali hybrids</i></b> <i>continued</i>	To control plant growth <i>continued</i>	<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	Less than 160 ppm spray x 1 Less than 8 ppm drench x 1 10 to 16 ppm liner soak x 1 2 ppm liner drench x 1	Excessive growth regulation of Husker Red with 160 ppm spray x 1 or 8 ppm drench x 1; Drench applied at 10 fl. oz. per trade gallon pot. Drench volume and mg a.i. will vary with pot size. Moderate growth regulation of Laura with liner soak; May need additional control; Moderate height control of Pike's Peak Purple with 80 ppm spray x 1; Good growth regulation of Red Rocks or Pike's Peak Purple with 2 ppm liner drench at 10 ml per liner in 72-cell tray ( <i>Virginia Tech</i> )	South	
			30 ppm spray x 1 to 2	Pensham Laura or Red Riding Hood may require multiple applications ( <i>Pilon 2012</i> )	North	
			15 ppm spray x 1	For Pinacolada; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Culture Sheets</i> )	Unspecified	
			2 to 3 ppm drench x 1			
			5 to 10 ppm spray x 1	Effective on Husker Red or Firebird ( <i>Ball Hort</i> )	North	
			5 to 10 ppm spray x 1	Effective on Midnight Masquerade ( <i>Walters Gardens Culture Sheet</i> )		
			<b>Concise/Sumagic</b>	5 ppm spray x 1 to 2	Pensham Laura or Red Riding Hood may require multiple applications ( <i>Pilon 2012</i> )	North
				30 ppm spray x 1	Good growth regulation of Pike's Peak Purple ( <i>Virginia Tech</i> )	South
				5 to 10 ppm spray x 1 to 3	Multiple applications required for hybrids ( <i>Fischer</i> )	Unspecified
			To increase basal branching	<b>Configure</b>	600 ppm spray x 1	Increased basal branching of Husker Red and vernalized Prairie Dusk; Increased lateral branching and number of flower stalks of unpinched Pike's Peak Purple; Increased lateral branching of Red Rocks ( <i>Virginia Tech</i> )
	<b><i>Perovskia atriplicifolia</i></b> (Russian Sage)	To control plant growth	<b>Abide/A-Rest</b>	25 to 100 ppm spray x 3	Weekly 25 to 50 ppm sprays ( <i>Pilon 2005</i> ). Apply 50 ppm sprays early in production and 100 ppm sprays later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ). Excellent control with three 100 ppm sprays at 10 day intervals ( <i>Michigan State Univ.</i> )	North
5,000 ppm spray x 2				Apply at 10- to 14-day intervals; Slight delay in flowering ( <i>Virginia Tech</i> )	South	
<b>Dazide/B-Nine</b>			3,750 to 5,000 ppm spray x 2 to 3	Apply 3,750 ppm sprays early in production and 5,000 ppm sprays later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North	
			2,500 ppm spray x 2 to 3	Excellent control with three sprays of 5,000 ppm at 10 day intervals ( <i>Michigan State Univ.</i> )		
			2,000 to 4,000 ppm spray x 1	As needed ( <i>Walters Gardens Culture Sheet; Pilon, GPN 2011</i> )	Unspecified	
			Tank Mix	( <i>Ball Hort</i> ); For Blue Steel, apply 2,500 to 3,000 ppm as needed ( <i>PanAmerican Seed, 2018</i> )		
<b>Citadel/Cycocel</b>			1,250 to 1,500 ppm spray x 3	Tank mix of 2,500 ppm daminozide + 3 ppm uniconazole for Lacey Blue ( <i>Pilon, GPN 2011</i> )	North	
			1,250 to 1,500 ppm spray x 3	Good control with three 1,500 ppm sprays at 10-day intervals ( <i>Michigan State Univ.</i> ); Weekly 1,250 ppm sprays ( <i>Pilon 2005</i> )	North	
To control plant growth			<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Good control; Multiple applications may be necessary ( <i>Virginia Tech, Auburn Univ.</i> )	South
				2,500 + 1,000 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		2,000 to 4,000 + 1,000 to 1,500 ppm spray		( <i>Ball Hort</i> )	Unspecified	
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	30 to 40 ppm spray x 1	Longin required higher rate of 80 ppm sprays; May require multiple applications ( <i>Virginia Tech</i> )	South	
			2 ppm liner soak x 1			
			30 to 45 ppm spray x 2 to 3	Three 30 ppm sprays at 10-day intervals gave excellent control ( <i>Michigan State Univ.</i> )	North	
			6 ppm drench x 1	Weekly sprays ( <i>Pilon 2005</i> ); Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )		

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
		<b>Concise</b> /Sumagic	15 to 30 ppm spray x 1	Good control; Multiple spray applications may be necessary ( <i>Virginia Tech</i> )	South
			1 ppm liner soak x 1		
			20 ppm spray x 2	Moderate height control with 2 applications 7 days apart ( <i>Louisiana State Univ.</i> )	North
			5 to 15 ppm spray x 2 to 3	Apply 5 ppm sprays early in production and 10 ppm sprays later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); 15 ppm spray x 3 at 10-day intervals gave excessive growth regulation ( <i>Michigan State Univ.</i> )	
			5 to 20 ppm spray	( <i>Ball Hort</i> )	
		Topflor	35 to 45 ppm spray x 1	This liner soak rate gave excessive early height reduction, but plants grew out by 7 weeks after treatment ( <i>Virginia Tech</i> )	South
Less than 2 ppm liner soak x 1					
<b>Persicaria microcephala</b> (Knotweed, Fleece Flower)	To control plant growth	<b>Concise</b> /Sumagic	45 ppm spray x 1	Good control of Red Dragon. Drench applied as 10 fl. oz. per trade gallon pot ( <i>Virginia Tech</i> )	South
			0.5 ppm drench x 1		
<b>Phlox paniculata</b> (Garden Phlox)	To control plant growth	<b>Abide</b> /A-Rest	Not responsive at 100 ppm spray x 4	Mt. Fuji not responsive to 4 sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			<b>Collate</b> /Florel	Not responsive at 500 ppm spray x 1	Starfire liners treated just after removal of cuttings from mist were not responsive to sprays or liner soaks; No effect on finished plants ( <i>Virginia Tech</i> )
		Not responsive at 40 ppm liner soak x 1			
		500 or 1,000 ppm spray x 1 to 3		Biweekly sprays provided no growth control nor increased branching, but increased the number of inflorescences per pot for Mt. Fuji ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Moderate response with Blue Boy, Bright Eyes and David, but Charles Curtis was not responsive; Apply at 10- to 14-day intervals ( <i>Virginia Tech</i> )	South
			3,750 ppm spray x 2 to 3	To control plant growth, begin applications early in crop cycle as stems are rapidly elongating ( <i>Pilon 2006</i> )	North
				Mt. Fuji was not responsive to 5,000 ppm spray x 4 applications at 2-week intervals ( <i>Michigan State Univ.</i> )	
		Tank Mix	Tank mix of 2,500 ppm daminozide + 5 ppm uniconazole x 1 to 3 ( <i>Pilon 2006</i> ); Opening Act responsive ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )		
		<b>Citadel</b> /Cycocel	Not responsive at 4,000 ppm spray x 1	Blue Boy and Charles Curtis were not responsive ( <i>Virginia Tech</i> )	South
			750 to 1,250 ppm spray x 2 to 3	Apply 750 ppm early in production and 1,000 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Weekly sprays of 1,250 ppm ( <i>Pilon 2005</i> ); Mt. Fuji was stunted with 4 applications of 1,500 ppm at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 4,000 ppm spray x 1	Good control of Blue Boy and Charles Curtis; Multiple applications required; David was not responsive ( <i>Virginia Tech</i> )	South
			5,000 + 1,500 ppm spray x 1	Label rate: Blue Boy and Charles Curtis; Multiple applications may be required (max 3) ( <i>Cycocel</i> )	Unspecified
		<b>Piccolo</b> / <b>Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	Not responsive at 160 ppm spray x 1	Blue Boy not responsive to spray, but moderate growth control of Blue Boy and Bright Eyes with liner soak ( <i>Virginia Tech</i> )	South
			4 ppm liner soak x 1		
			45 to 60 ppm spray x 2 to 3	To control plant growth, begin applications early in crop cycle as stems are rapidly elongating; Weekly 45 ppm sprays as necessary ( <i>Pilon 2006</i> ); Good control of Mt. Fuji with 60 ppm spray applied 4 times at 2-week intervals ( <i>Michigan State Univ.</i> )	North
10 ppm drench x 1	Control with single drench; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2012</i> )				

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Phlox paniculata</i> (Garden Phlox) <i>continued</i>	To control plant growth <i>continued</i>	<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only) <i>continued</i>	3 to 4 ppm drench x 1	For Peacock; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Culture Sheets</i> )	Unspecified
			45 ppm spray x 1 to 3	Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	
			10 ppm drench x 1		
		<b>Concise/Sumagic</b>	60 ppm spray x 1	Moderate control of David, but Blue Boy and Charles Curtis were not responsive to sprays; However, Blue Boy, Bright Eyes and David had moderate growth control with liner soaks ( <i>Virginia Tech</i> )	South
			2 ppm liner soak x 1		
			10 ppm spray x 1	Opening Act ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	Unspecified
	To increase lateral branching	<b>Configure</b>	5 to 10 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Weekly 10 ppm sprays ( <i>Pilon 2006</i> ); Mt. Fuji was stunted with 4 applications of 15 ppm at 2-week intervals ( <i>Michigan State Univ.</i> ). Or multiple applications of a tank mix of 3 ppm uniconazole plus 2,000 ppm daminozide ( <i>Pilon 2012</i> ); 10 ppm x 1 for Cloudburst tall cushion phlox and Kung Fuchsia ( <i>Walters Gardens Culture Sheet</i> )	North
			75 ppm spray x 1	Moderate growth control of David; Multiple applications may be required ( <i>Virginia Tech</i> )	South
<i>Phlox subulata</i> (Thrift, Moss Pink, Creeping Phlox)	To control plant growth	<b>Abide/A-Rest</b>	Less than 100 ppm spray x 6	Excessive growth reduction of Emerald Blue; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine</b>	Not responsive at 5,000 ppm spray x 2	Apple Blossom not responsive ( <i>Virginia Tech</i> )	South
			5,000 ppm spray x 6	Good control of Emerald Blue with weekly applications ( <i>Michigan State Univ.</i> )	North
		<b>Citadel/Cycocel</b>	1,500 ppm spray x 6	Stunting of Emerald Blue; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Moderate control of Apple Blossom ( <i>Virginia Tech</i> )	South
			2,500 + 1,000 ppm spray	( <i>Syngenta Culture Sheets</i> )	Unspecified
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	120 ppm spray x 1	Moderate control of Apple Blossom; Multiple applications may be required ( <i>Virginia Tech</i> )	South
			Less than 90 ppm spray x 6	Excessive growth reduction of Emerald Blue; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	North
		<b>Concise/Sumagic</b>	15 ppm spray x 1	Good control of Apple Blossom ( <i>Virginia Tech</i> )	South
			Less than 15 ppm spray x 6	Stunting of Emerald Blue; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	North
<b>Topflor</b>	30 ppm spray x 1	Good control of Apple Blossom ( <i>Virginia Tech</i> )	South		
<i>Platycodon grandiflorus</i> (Balloon Flower)	To control plant growth	<b>Abide/A-Rest</b>	25 to 100 ppm spray x 1 to 4	25 to 50 ppm sprays applied once or twice at weekly intervals ( <i>Pilon 2006</i> )	North
				Excellent growth control of Sentimental Blue with 4 applications at 2-week intervals ( <i>Michigan State Univ.</i> )	
		<b>Collate/Florel</b>	500 ppm spray x 4	Biweekly sprays reduced growth of Sentimental Blue with slight delay in flowering ( <i>Michigan State Univ.</i> )	North
<b>Dazide/B-Nine</b>	2,500 to 3,750 ppm spray x 1 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); 4 applications of 5,000 ppm spray at 2-week intervals caused excessive growth reduction of Sentimental Blue; Reduce rate or frequency ( <i>Michigan State Univ.</i> ); 2,500 ppm sprays once or twice ( <i>Pilon 2006</i> ); 2,500 ppm spray x 1 to 2, 14-days apart ( <i>Walters Gardens Culture Sheet</i> )	North		

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
			Tank Mix	Tank mix of 2,000 ppm daminozide + 3 ppm uniconazole x 1 to 2 ( <i>Pilon 2006</i> )	North
			1,000 ppm spray x 1 to 3	For Miss Tilly, multiple applications as needed to control plant habit; Higher rates may burn leaf edges; Begin applications 2 to 3 weeks after transplant ( <i>Syngenta Culture Sheets</i> )	Unspecified
		<b>Citadel/Cycocel</b>	750 to 1,500 ppm spray x 1	( <i>Auburn Univ.</i> )	South
			1,500 ppm spray x 4	4 applications at 2-week intervals provided good growth control of Sentimental Blue ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine + Citadel/Cycocel</b> Tank Mix	3,000 + 1,500 ppm spray x 4	4 applications at 2-week intervals caused excessive growth reduction of Sentimental Blue; Reduce frequency or rate ( <i>Michigan State Univ.</i> )	North
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	30 to 60 ppm spray x 1 to 4	30 ppm sprays applied once or twice at weekly intervals or a single drench; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	North
			4 ppm drench x 1	4 applications of 60 ppm spray at 2-week intervals provided excellent growth control of Sentimental Blue ( <i>Michigan State Univ.</i> )	
		<b>Concise/Sumagic</b>	5 ppm spray x 1 to 2	Weekly sprays ( <i>Pilon 2006</i> )	North
				Recommended ( <i>Walters Gardens Culture Sheet</i> ); Four applications of 15 ppm spray at 2-week intervals caused excessive growth reduction of Sentimental Blue; Reduce frequency or rate ( <i>Michigan State Univ.</i> );	
	Induce lateral or basal branching	<b>Configure</b>	Phyto	Single foliar spray at 300 ppm resulted in significant phytotoxicity to liners ( <i>Virginia grower</i> )	Branching
<b>Polemonium caeruleum</b> (Jacob's Ladder)	To control plant growth	<b>Dazide/B-Nine</b>	2,500 to 3,750 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Weekly applications of 2,500 ppm ( <i>Pilon 2005</i> )	North
			Tank Mix	Three weekly applications of a tank mix of 1,250 ppm daminozide + 3.75 ppm uniconazole gave excellent control of Heavenly Blue ( <i>Pilon 2006</i> )	
		<b>Dazide/B-Nine + Citadel/Cycocel</b> Tank Mix	2,500 + 1,500 ppm spray x 1	Label rate ( <i>Cycocel</i> )	Unspecified
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	30 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		<b>Concise/Sumagic</b>	5 ppm sprays x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		Topflor	6 ppm drench x 1	Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> )	North
<b>Primula polyanthus</b> (Polyanthus Primrose)	To control plant growth	<b>Concise/Sumagic</b>	5 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
<b>Rosa</b> (Rose)	To control plant growth	<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	60 ppm sprays x 2 to 6	Knock Out - Multiple applications required ( <i>Pilon 2012</i> )	North
			<b>Concise/Sumagic</b>	45 to 60 ppm spray x 1 or 0.25 ppm drench x 1	Knock Out roses had short-term response to sprays; Multiple spray applications required; Drench controlled growth through 6 weeks after treatment, reduced height 35% without reducing width; Drench applied at 10 fl. oz. per trade gal. pot; Drench volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )
	Induce lateral or basal branching	<b>Configure</b>	100 ppm spray x 2 or more	Foliar spray 2 to 32 times; slight increase in branching and increase in the length of the side branches. Subsequent flowering was increased; effect was better than pinching ( <i>Fine Configure Guide</i> )	Branching

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Rosmarinus officinalis</b> (Rosemary)	To control plant growth	<b>Collate</b> /Florel	Not responsive at 500 ppm spray x 1	Hill Hardy liners treated 2 weeks after removal from mist; Liners not responsive to spray; Moderate height reduction with drench; No significant increase in branching on liners or finished plants ( <i>Virginia Tech</i> )	South
			500 ppm drench x 1		
		<b>Dazide</b> /B-Nine	2,500 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
			5,000 ppm spray x 2	Moderate growth control of Hill Hardy ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	2,000 + 1,000 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		<b>Piccolo</b> / <b>Piccolo 10 XC</b> /Bonzi/Paczol	30 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
		<b>Concise</b> /Sumagic	5 ppm spray x 2 to 3	Weekly sprays ( <i>Pilon 2005</i> )	North
	To increase lateral or branching	<b>Configure</b>	300 ppm spray x 2 on liners	Applied approximately 28 days after sticking, moderately rooted, increased numbers of shoots and branches and shoot growth of liners ( <i>Virginia Tech</i> )	Branching
	<b>Rudbeckia fulgida var. sullivantii</b> Goldsturm (Orange Coneflower, Black-eyed Susan)	To control plant growth; begin applications as flower stalks near leaf canopy as they bolt rapidly	<b>Abide</b> /A-Rest	50 ppm spray x 2 to 3	Begin applications as flower stalks near leaf canopy, as they bolt rapidly ( <i>Pilon 2006</i> ; Univ. Minnesota); 6 weekly 100 ppm sprays stunted plants; Reduce rate or frequency ( <i>Michigan State Univ.</i> )
<b>Collate</b> /Florel			Not responsive at 500 ppm spray x 1	No growth control and no flowering data ( <i>Virginia Tech</i> )	South
<b>Dazide</b> /B-Nine			2,000 to 5,000 ppm spray x 2 to 6	Apply 2 to 3 weekly applications of 3,750 ppm spray ( <i>Pilon 2006</i> )	North
				Apply lower rates (3,750 ppm) early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); 6 weekly sprays at 5,000 ppm gave excellent control ( <i>Michigan State Univ.</i> )	
				Apply 2,000 ppm as needed ( <i>Walters Gardens Culture Sheet</i> )	
Tank Mix			Apply two to three weekly sprays of tank mix of 2,500 ppm daminozide + 5 ppm uniconazole ( <i>Pilon 2006</i> )		
<b>Citadel</b> /Cycocel			Not responsive at 4,000 ppm spray x 1	Not responsive ( <i>Virginia Tech</i> )	South
<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix			1,000 to 1,500 ppm spray x 2 to 3	Apply 1,000 ppm early in production and 1,250 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); 6 weekly sprays at 1,500 ppm gave excellent control ( <i>Michigan State Univ.</i> )	North
			1,250 to 2,500 + 1,000 to 1,250 ppm spray x 2 to 3	Apply 2 to 3 weekly sprays of 2,500 + 1,250 ppm ( <i>Pilon 2006</i> ); Apply 1,250 + 750 ppm early in production and 2,500 + 1,000 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	
<b>Piccolo</b> / <b>Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)			80 to 120 ppm spray x 1	Multiple applications may be necessary ( <i>Virginia Tech</i> )	South
			10 to 45 ppm spray x 2 to 3	Apply 10 ppm early in production and 20 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Weekly 45 ppm sprays as necessary ( <i>Pilon 2006</i> ); 6 weekly sprays at 90 ppm gave excellent control ( <i>Michigan State Univ.</i> )	North
			20 to 30 ppm spray x 1	Goldsturm ( <i>PanAmerican Seed, 2018</i> )	Unspecified
			6 to 10 ppm drench x 1	Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2012</i> )	North

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION		
		<b>Concise</b> /Sumagic	30 ppm spray x 1	Good control; Drench applied as 2 fl. oz. per qt. pot; Drench volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	South		
			1 ppm liner soak x 1				
			2 ppm drench x 1				
				<b>Concise</b> /Sumagic	10 ppm spray x 2 to 3	Apply 2 to 3 weekly sprays ( <i>Pilon 2006</i> ); 6 weekly sprays at 15 ppm caused excessive growth reduction; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	North
					3 ppm spray x 1 to 2	( <i>Walters Gardens Culture Sheet</i> )	
					5 to 10 ppm spray x 1	Goldsturm ( <i>PanAmerican Seed, 2018</i> )	Unspecified
	Induce lateral or basal branching on liners	<b>Configure</b>	300 ppm spray x 1	Single foliar spray increased basal branching with significant early phytotoxicity ( <i>Virginia grower</i> )	Branching		
			600 ppm spray x 1 on liners	No increased branching of Viette's Little Suzie, but decreased plant width ( <i>Virginia Tech</i> )	Branching		
<b>Rudbeckia hirta</b> (Black-eyed Susan)	To control plant growth; apply PGRs just after bloom initiation, but before bud has formed to reduce flower delay ( <i>Benary, GrowerTalks 2010</i> )	<b>Dazide</b> /B-Nine	2,500 to 5,000 ppm spray x 1	For Denver Daisy, apply just after bloom initiation, but before bud has formed to reduce flower delay ( <i>Benary, GrowerTalks 2010</i> )	Unspecified		
			2,500 to 5,000 ppm spray x 1	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North		
		<b>Citadel</b> /Cycocel	Phyto at 1,500 ppm spray x 1	Excessive phytotoxicity on Indian Summer ( <i>Virginia Tech</i> )	South		
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	Phyto at 5,000 + 1,500 ppm spray x 1	Excessive phytotoxicity on Indian Summer ( <i>Virginia Tech</i> )	South		
		<b>Piccolo</b> / <b>Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	160 ppm spray x 1	Little control of Indian Summer; Multiple applications or higher rates required ( <i>Virginia Tech</i> )	South		
			30 ppm spray x 1	For Denver Daisy, apply just after bloom initiation, but before bud has formed to reduce flower delay; Apply drench at 4 to 6 weeks after transplant; Drench volume and mg a.i. vary with pot size ( <i>Benary, GrowerTalks 2010</i> )	Unspecified		
			1 to 5 ppm drench x 1				
		<b>Concise</b> /Sumagic	10 ppm spray x 1	For Denver Daisy ( <i>Benary, GrowerTalks 2010</i> )	Unspecified		
			25 ppm spray x 1	Good control under outdoor conditions ( <i>Clemson Univ.</i> )	South		
			To increase basal branching	<b>Configure</b>	200 ppm spray x 1	For Denver Daisy, spray to glisten ( <i>Benary, GrowerTalks 2010</i> )	Branching
					Not responsive to 50 to 1,600 ppm spray x 1	Single foliar spray applied 4 weeks after potting controlled plant height but did not affect branching; 800 or 1,600 ppm caused phytotoxicity ( <i>Fine Configure Guide</i> )	Branching
		<b>Salvia farinacae Hybrids</b> (Mealy Cup Sage)	To control plant growth	<b>Dazide</b> /B-Nine	2,500 ppm spray x 1	Spray day after sticking. Follow with tank mix of 2,500 ppm daminozide + 10 ppm ancymidol if needed; Repeat daminozide at weeks 4 and 5 if needed ( <i>Greenhouse Grower Perennial Production Guide 2016</i> )	Unspecified
Induce lateral or basal branching	<b>Configure</b>		250 ppm spray x 1	Controlled height and increased branching ( <i>Fine Configure Guide</i> )	Branching		
<b>Salvia guaranitica</b> (Anise sage)	To control plant growth	<b>Concise</b> /Sumagic	1 ppm liner soak or drench x 1	Black and Blue very responsive to soak or drench (0.3 oz. per 74-size cell) before transplant or foliar spray immediately after transplant ( <i>Virginia Tech</i> )	South		
		30 ppm spray x 1 at transplant					

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Salvia leucantha</b> (Velvet Sage, Mexican Sage)	To control plant growth	Dazide/B-Nine	5,000 ppm spray x 3	Apply at 10- to 14-day intervals ( <i>Univ. Georgia</i> )	South
		Dazide/B-Nine + Citadel/Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1	( <i>Univ. Georgia</i> )	South
			2,500 ppm spray x 2 to 3	Apply at weekly intervals as needed ( <i>Walters Gardens Cultural Sheet</i> )	North
		Citadel/Cycocel	2,250 ppm spray x 1	( <i>Univ. Georgia</i> )	South
		Piccolo/Piccolo 10 XC/Bonzi/Paczol	60 ppm spray x 1	( <i>Univ. Georgia, Virginia Tech</i> )	South
		Concise/Sumagic	30 ppm spray x 1	No landscape persistence at 30 ppm ( <i>Univ. Georgia</i> )	South
		Topflor	30 ppm spray x 1	( <i>Virginia Tech</i> )	South
<b>Salvia x sylvestris</b>	To control plant growth	Abide/A-Rest	25 to 100 ppm spray x 2 to 6	2 to 3 sprays at 25 to 50 ppm ( <i>Pilon 2006</i> ); 2 to 3 sprays at 50 ppm ( <i>Univ. Minnesota</i> ); Good control of growth of Blue Queen with 6 weekly spray applications of 100 ppm ( <i>Michigan State Univ.</i> )	North
1 to 2 ppm drench x 1			Drench volume and mg a.i. vary with pot size ( <i>SePro Specific Species and Application Rates</i> )	Unspecified	
Salvia nemorosa		Collate/Florel	Not responsive at 400 ppm spray x 4	All sprays phytotoxic to May Night; Did not reduce flower buds; Reduced growth ( <i>Michigan State Univ.</i> )	North
			125 to 500 ppm spray x 1 or 2 on liners and finished plants 10 to 40 ppm liner soaks x 1 on liners	Treatment of Aurea liners just after removal from mist with 125 to 500 ppm sprays or 10 to 40 ppm liner soaks gave no growth control and only 10 ppm liner soak x 1 increased branching of liners; There were no persistent effects on finished plants. Biweekly 500 ppm sprays gave moderate growth control and increased number of inflorescences of May Night ( <i>Virginia Tech</i> )	South
Salvia hybrids Meadow Sage) Salvia officinalis (Garden sage)		Dazide/B-Nine	5,000 ppm spray x 2	Indigo Spires not responsive, but this rate stunted and delayed flowering of Blue Queen, and controlled growth and increased flower number of May Night ( <i>Virginia Tech</i> )	South
			2,500 to 5,000 ppm spray x 2 to 3	Daminozide has shown the most effectiveness of all PGRs on salvia; Apply 2,500 ppm sprays 2 to 3 times weekly ( <i>Pilon 2006</i> ); Apply 3,750 ppm early in production and 5,000 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); 6 weekly 5,000 ppm sprays stunted Blue Queen; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	North
			1,500 to 2,500 ppm spray x 1 to 3	Generally not needed, but 1,500 to 2,500 ppm sprays are effective ( <i>Ball Hort</i> ); Sprays at 2,500 ppm effective on Bordeaux ( <i>Syngenta Culture Sheets</i> ); 2500 ppm x 2 to 3 at weekly intervals ( <i>Walters Gardens</i> ); 2,500 to 3,750 ppm sprays effective on S. officinalis Aurea (PW Culture Sheets); For New Dimension series apply 1,500 to 2,000 ppm sprays as needed ( <i>PanAmerican Seed, 2018</i> ); Color Spires apply 2,500 ppm spray x 1 ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	Unspecified
			Tank Mix	Apply 2 to 3 sprays of tank mix of 2,000 daminozide + 3 ppm uniconazole ( <i>Pilon 2006</i> )	
		Citadel/Cycocel	750 to 1,500 ppm spray x 2 to 6	Apply 750 ppm early in production and 1,000 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Apply 2 to 3 weekly 1,250 ppm sprays ( <i>Pilon 2006</i> ); Good control of growth of Blue Queen with 6 weekly spray applications of 1,500 ppm ( <i>Michigan State Univ.</i> )	North
		Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)	80 ppm spray x 1	Cultivar differences: Good control of Blue Queen with single spray at 80 ppm; Indigo Spires not responsive at 60 ppm x 1; Blue Hill and May Night not responsive at 160 x 1 ( <i>Virginia Tech</i> )	South
30 ppm spray x 2 to 3			Weekly sprays as necessary; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2006</i> ); Blue Queen not responsive with 6 weekly spray applications of 90 ppm ( <i>Michigan State Univ.</i> )	North	
6+ ppm drench x 1					
10 to 15 ppm spray x 1			Generally not needed, but paclobutrazol is effective ( <i>Ball Hort</i> )	Unspecified	
40 to 60 ppm spray x 1		40 to 60 ppm spray is the label rate.			

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
		<b>Concise</b> /Sumagic	15 to 60 ppm spray x 1	Indigo Spires very responsive at 15 ppm, but may require multiple applications; Good control of Blue Queen with a single 60 ppm spray; May Night not responsive to a single 20 ppm spray ( <i>Virginia Tech</i> )	South
			5 to 15 ppm spray x 2 to 6	2 to 3 weekly sprays at 5 ppm ( <i>Pilon 2006</i> ). Excellent control of growth of Blue Queen with 6 weekly spray applications of 15 ppm ( <i>Michigan State Univ.</i> ). Apply 5 ppm early in production and 10 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Color Spires apply 5 to 7 ppm spray x 1 ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	North
			10 ppm spray x 1	Single application early in production ( <i>Oklahoma grower, Sumagic Advisor 2004</i> )	South
	To increase lateral branching	<b>Configure</b>	300 ppm spray x 1 or 2 on liners	Single or multiple foliar sprays applied to May Night approximately 34 days after sticking increased basal branching; Apply after liners are well rooted ( <i>Virginia Tech</i> )	Branching
			400 ppm spray x 1 on finished plants	Single foliar spray applied 2 weeks after potting; Branching increased; Flowering delayed with higher rates ( <i>NC State Univ.</i> )	Branching
	<b>Scabiosa columbaria</b> (Pincushion Flower)	To control plant growth; apply PGRs as flower stalk starts to elongate or if rosette appears to be elongating with flowers ( <i>Pilon 2006</i> )	<b>Abide</b> /A-Rest	25 to 50 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); No control of Butterfly Blue with four 100 ppm sprays at 2-week intervals ( <i>Michigan State Univ.</i> )
1 to 2 ppm drench x 1				Drench volume and mg a.i. vary with pot size ( <i>SePro Specific Species and Application Rates</i> )	Unspecified
<b>Collate</b> /Florel			Not responsive at 400 ppm spray x 4	All sprays phytotoxic to Giant Blue; Reduced growth. Four biweekly 500 ppm sprays had no effect on Butterfly Blue ( <i>Michigan State Univ.</i> )	North
			500 ppm spray x 2	Biweekly sprays gave moderate growth control and slightly delayed flowering of Butterfly Blue ( <i>Virginia Tech</i> )	South
<b>Dazide</b> /B-Nine			5,000 ppm spray x 3 to 4	Good growth control of Butterfly Blue ( <i>Univ. Georgia</i> ) and moderate control of overwintered Pink Mist ( <i>Virginia Tech</i> )	South
			2,500 to 5,000 ppm spray x 2 to 3	Weekly 2,500 ppm sprays ( <i>Pilon 2006</i> ); Apply 2,500 ppm early in production and 3,750 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Good control of Butterfly Blue with four 5,000 ppm sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			2,500 to 4,000 ppm spray x 1 to 3	Scabiosa is responsive to daminozide ( <i>Ball Hort</i> )	Unspecified
<b>Citadel</b> /Cycocel			Not responsive at 1,500 ppm spray x 1	Pink Mist not responsive ( <i>Virginia Tech</i> )	South
<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix			5,000 + 1,500 ppm spray x 1	Moderate control of Butterfly Blue, but little control of overwintered Pink Mist; Test multiple applications ( <i>Virginia Tech</i> )	South
			2,500 to 4,000 + 1,000 to 1,500 ppm spray	Scabiosa is responsive to tank mix ( <i>Ball Hort</i> )	Unspecified
<b>Piccolo/Piccolo 10 XC</b> /Bonzi/ Paczol/Downsize (drenches only)			60 ppm spray x 1	Moderate control of Pink Mist ( <i>Virginia Tech</i> )	South
			30 ppm spray x 2 to 3	Weekly applications ( <i>Pilon 2006</i> ); Excessive growth reduction of Butterfly Blue with four 60 ppm sprays at 2-week intervals; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	North
			30 ppm spray x 1 to 3	Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified
			3 ppm drench x 1		
<b>Concise</b> /Sumagic			20 to 30 ppm spray x 1	Good growth regulation of Butterfly Blue with 20 ppm ( <i>Univ. Georgia</i> ), but higher rates or multiple applications necessary for Pink Mist ( <i>Virginia Tech</i> )	South
			5 ppm spray x 2 to 3	Weekly sprays at 5 ppm ( <i>Pilon 2006</i> ); Excessive growth reduction of Butterfly Blue with four 15 ppm sprays at 2-week intervals; Reduce rate or frequency ( <i>Michigan State Univ.</i> )	North
			10 to 20 ppm spray	Scabiosa is responsive to uniconazole ( <i>Ball Hort</i> )	Unspecified

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Scabiosa columbaria</b> (Pincushion Flower) <i>continued</i>	To control plant growth; apply PGRs as flower stalk starts to elongate or if rosette appears to be elongating with flowers ( <i>Pilon 2006</i> )	Topflor	30 to 45 ppm spray x 1	Moderate control of Pink Mist; Test multiple applications as necessary; High rates (60 to 75 ppm) reduced flowering ( <i>Virginia Tech</i> )	South
	Induce lateral or basal branching	<b>Configure</b>	Not responsive at 50 to 800 ppm spray x 1	Single foliar spray applied 2 weeks after potting had no effect on branching ( <i>NC State Univ.</i> )	Branching
<b>Scutellaria hybrid</b> (Skullcap)	Induce lateral or basal branching	<b>Configure</b>	Not responsive to 50 to 800 ppm spray x 1	Not responsive to single foliar spray applied 2 weeks after potting ( <i>Fine Configure Guide</i> )	Branching
<b>Sedum x Autumn Joy</b> (Sedum)	To control plant growth	<b>Abide/A-Rest</b>	Not responsive at 100 ppm spray x 4	Autumn Joy not responsive to 4 sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		<b>Collate/Florel</b>	500 ppm spray x 4	Moderate growth control of Autumn Joy with biweekly sprays ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	Moderate control of Autumn Joy; Apply at 10- to 14-day intervals ( <i>Univ. Georgia, Virginia Tech</i> )	South
			2,500 to 5,000 ppm spray x 2 to 4	2 to 3 weekly sprays at 2,500 ppm ( <i>Pilon 2006</i> ) Good control of Autumn Joy with four 5,000 ppm sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			Tank Mix	Apply tank mix of 2,000 ppm daminozide + 15 ppm paclobutrazol as needed ( <i>Pilon 2006</i> )	
		<b>Citadel/Cycocel</b>	Not responsive at 4,000 ppm spray x 1	Autumn Joy not responsive ( <i>Virginia Tech</i> )	South
			Not responsive at 1,500 ppm spray x 4	Autumn Joy not responsive to 4 sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
		<b>Collate/Florel</b>	300 to 500 ppm x 1	To help control growth and increase branching or delay flowering ( <i>Ball Hort</i> )	Unspecified
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Moderate control of Autumn Joy; Multiple applications may be required ( <i>Virginia Tech</i> )	South
			2,000 + 1,000 ppm spray x 2 to 3	Weekly applications ( <i>Pilon 2006</i> )	North
			2,500 to 3,500 + 750 to 1,000 ppm spray	Tank mix will help control growth ( <i>Syngenta Culture Sheets</i> )	Unspecified
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize</b> (drenches only)	80 to 160 ppm spray x 1 to 2 Less than 10 ppm drench x 1	Good control of Autumn Joy with a single 80 ppm spray, but Matriona requires multiple applications at higher rates; Excessive growth regulation of Autumn Joy with 10 ppm drench at 2 fl. oz. per quart pot ( <i>Virginia Tech</i> )	South
			30 to 60 ppm spray x 2 to 4	2 to 9 weekly 30 ppm sprays ( <i>Pilon 2006</i> ) or single drench; Drench volume and mg a.i. vary with pot size ( <i>Pilon 2012</i> ); Excellent control of Autumn Joy with four 60 ppm sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
			6 to 10 ppm drench x 1		
		<b>Concise/Sumagic</b>	15 to 45 ppm spray x 1	Rates higher than 30 ppm on Autumn Joy caused persistent reductions in plant growth in the landscape ( <i>Univ. Georgia</i> ); Matriona requires higher rates and/or multiple applications ( <i>Virginia Tech</i> )	South
			5 to 15 ppm spray x 2 to 4	2 to 3 weekly 5 ppm sprays ( <i>Pilon 2006</i> ); Excellent control of Autumn Joy with four 15 ppm sprays at 2-week intervals ( <i>Michigan State Univ.</i> )	North
	Topflor	37 to 60 ppm spray x 1	Good control of Autumn Joy with a single 37 ppm spray; May require multiple applications; Matriona height was not reduced with a single 120-ppm spray, but width was reduced with a single 60-ppm spray ( <i>Virginia Tech</i> )	South	
	To increase lateral branching	<b>Configure</b>	600 ppm spray x 2 on liners	On liners: Autumn Joy treated twice (18 days after sticking and 5 days after transplant) had double the number of shoots and 3 times as many lateral branches with no reduction in growth ( <i>Virginia Tech</i> )	Branching

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b><i>Sedum spurium</i></b>	To control plant growth	<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	10 to 20 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
		<b>Concise</b> /Sumagic	5 to 10 ppm spray x 2 to 3	Apply lower rates early in production and higher rates later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> )	North
<b><i>Sempervivum</i></b> (Hens and Chicks)	To increase number of offsets	<b>Configure</b>	200 to 400 ppm spray x 1	Increased offsets; Did not affect subsequent rooting of offsets; Cultivars varied in the number of offsets produced ( <i>NC State Univ.</i> )	Branching
<b><i>Sorghastrum nutans</i></b> (Indiangrass)	To control plant growth	<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Moderate growth response with Indian Steel ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 2	Good height control with Indian Steel ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	160 ppm spray x 1	Moderate growth response with Indian Steel ( <i>Virginia Tech</i> )	South
		<b>Concise</b> /Sumagic	45 ppm spray x 1	Moderate growth response with Indian Steel; May require multiple applications ( <i>Virginia Tech</i> )	South
<b><i>Stokesia laevis</i></b> (Stokes Aster)	To control plant growth	<b>Abide</b> /A-Rest	100 ppm spray x 4	Biweekly sprays gave excellent growth control of Klaus Jelitto ( <i>Michigan State Univ.</i> )	North
		<b>Collate</b> /Florel	500 ppm spray x 4	Biweekly sprays gave excellent growth control of Klaus Jelitto and plants appear more well branched ( <i>Michigan State Univ.</i> )	North
		<b>Citadel</b> /Cycocel	1,500 ppm spray x 4	Moderate growth control of Klaus Jelitto ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Purple Parasols and Klaus Jelitto responsive; Apply at 10- to 14-day intervals ( <i>Univ. Georgia, Virginia Tech</i> )	South
			5,000 ppm spray x 4	Biweekly sprays gave excellent growth control of Klaus Jelitto ( <i>Michigan State Univ.</i> )	North
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 to 2,250 ppm spray x 1	Purple Parasols and Klaus Jelitto responsive; May require multiple applications ( <i>Univ. Georgia, Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	40 to 80 ppm spray x 1	Good control of Purple Parasols ( <i>Univ. Georgia</i> )	South
			Not responsive at 40 to 80 ppm spray x 1 or 2 ppm drench x 1	Klaus Jelitto was not responsive at 80 ppm spray x 1 or 2 ppm drench x 1 applied at 2 fl. oz. per quart pot; Drench volume and mg a.i. vary with pot size ( <i>Virginia Tech</i> )	
			Less than 60 ppm spray x 4	Biweekly sprays gave excessive growth reduction of Klaus Jelitto; Reduce frequency ( <i>Michigan State Univ.</i> )	North
		<b>Concise</b> /Sumagic	Less than 60 ppm spray x 1	Excessive control of Silver Moon at 60 ppm, but Purple Parasols and Klaus Jelitto were not responsive at this rate ( <i>Univ. Georgia, Virginia Tech</i> )	South
			Less than 15 ppm spray x 4	Biweekly sprays gave excessive growth reduction of Klaus Jelitto; Reduce frequency ( <i>Michigan State Univ.</i> )	North
	To induce lateral branching	<b>Configure</b>	Not responsive at 600 ppm spray x 1	Silver Moon not responsive; This rate was our screening rate; Higher rates may be effective ( <i>Virginia Tech</i> )	Branching

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<b>Tradescantia virginiana</b> (Virginia Spiderwort)	To control plant growth	<b>Dazide</b> /B-Nine	5,000 ppm spray x 2	Moderate growth control Red Cloud and Blue Stone. Multiple applications necessary ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 2	Moderate growth control Red Cloud; Multiple applications necessary. Blue Stone not responsive at 5,000 + 1,500 ppm spray x 1 ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol	40 to 80 ppm spray x 1	Use higher rate for Red Cloud ( <i>Virginia Tech</i> )	South
		<b>Concise</b> /Sumagic	15 to 30 ppm spray x 1	Use higher rate for Red Cloud ( <i>Virginia Tech</i> )	South
		Topflor	15 to 45 ppm spray x 1	Red Cloud responsive to low rate. Use higher rate for Blue Stone ( <i>Virginia Tech</i> )	South
<b>Verbena bonariensis</b> (Tall Verbena, Brazilian Verbena)	To control plant growth	<b>Collate</b> /Florel	500 ppm spray x 1 on liners	Spray applied 2 days after removal of cuttings from mist; Increased lateral branching (3.5 times) of Lollipop liners with moderate growth regulation (3 weeks after treatment); No persistent effects on finished plants (8 weeks after treatment) ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine	2,500 to 5,000 ppm spray x 1	Buenos Aires, additional sprays may be required ( <i>PanAmerican Seed, 2018</i> )	Unspecified
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	80 ppm spray x 1	Moderate height control of Lollipop with single treatment; Drench at 2 fl. oz. per quart pot; Drench volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	South
	10 ppm drench x 1				
To induce lateral branching	<b>Configure</b>	300 ppm spray x 2 on liners	Increased lateral branching (2.5 times) of Lollipop liners; First spray applied 13 days after sticking, second spray 14 days later; No persistent effect on finished plants ( <i>Virginia Tech</i> )	Branching	
<b>Verbena canadensis</b> (Clump Verbena)	To control plant growth	<b>Collate</b> /Florel	500 ppm spray x 1 to 2	Moderate growth reduction of Homestead Purple and Taylortown Red with no negative effects ( <i>Virginia Tech</i> )	South
			500 ppm spray x 1	Moderate growth control of Homestead Purple with delayed flowering ( <i>Auburn Univ.</i> )	South
		<b>Dazide</b> /B-Nine	Not responsive at 5,000 ppm spray x 2	Homestead Purple not responsive ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine + <b>Citadel</b> /Cycocel Tank Mix	5,000 + 1,500 ppm spray x 1	Good control of Homestead Purple, but multiple applications may be required ( <i>Virginia Tech</i> )	South
			2,000 + 1,000 ppm spray x 2 to 3	Weekly sprays as necessary ( <i>Pilon 2005</i> )	North
		<b>Piccolo/Piccolo 10 XC</b> /Bonzi/Paczol/Downsize (drenches only)	45 ppm spray x 2 to 3	Weekly sprays as necessary; Drench volume and mg a.i. will vary with pot size ( <i>Pilon 2005, 2006</i> )	North
			4 ppm drench x 1		
			120 to 160 ppm spray x 1		
		Greater than 3 ppm drench x 1			
		<b>Concise</b> /Sumagic	15 to 60 ppm spray x 1	A 15 ppm spray application had very short-term effect on Homestead Purple; Multiple applications required; A 60-ppm spray application gave moderate control of Homestead Red Carpet; 2 applications of 60 ppm caused excessive growth reduction; An 8-ppm drench or 2-ppm liner soak gave moderate control of Homestead Red Carpet; Test higher rates; Drench applied at 10 fl. oz. per trade gal. pot, drench volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	South
			8 ppm drench x 1		
			2 ppm liner soak x 1		
	To induce lateral or basal branching	<b>Configure</b>	250 to 1,000 ppm spray x 1	Single foliar sprays immediately after pinching increased lateral branching; 1,000 ppm controlled shoot elongation by 19% ( <i>Virginia Tech</i> )	Branching
<b>Verbena rigida</b> (Upright Verbena, Tuberous Vervain)	To control plant growth	<b>Collate</b> /Florel	Not responsive at 500 ppm spray x 2	Higher rates reduced height slightly, but there was no increased branching ( <i>Virginia Tech</i> )	South
		<b>Dazide</b> /B-Nine	2,000 to 2,500 ppm spray x 1	Santos Purple, multiple applications may be necessary ( <i>PanAmerican Seed, 2018</i> )	Unspecified

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
	To induce lateral branching	Atrimmec	800 ppm spray x 1	Increased branching; Little height control ( <i>Virginia Tech</i> )	Branching
		<b>Configure</b>	600 ppm spray x 1	Increased number of shoots and branching ( <i>Virginia Tech</i> )	Branching
<b>Veronica spicata</b> (Spike speedwell)	To control plant growth	<b>Abide/A-Rest</b>	25 to 100 ppm spray x 2 to 4	One or two weekly sprays at 25 ppm ( <i>Pilon 2006</i> ); Apply 50 ppm early in production and 75 ppm later under better growing conditions; Multiple applications may be required ( <i>Univ. Minnesota</i> ); Three 100-ppm sprays at 10-day intervals gave excellent control of Blue ( <i>Michigan State Univ.</i> )	North
			<b>Collate/Florel</b>	125 to 500 ppm spray x 1 on liners	Treatments applied the day after removal of cuttings from mist. No height control of Goodness Grows liners or finished plants, but liners had 4 times the number of basal branches with 500-ppm spray; No persistent increase in branching on finished plants. First Love liners showed no response to 125- to 500-ppm spray, but the finished plants had 3 times the number of leaders and a greater number of lateral branches ( <i>Virginia Tech</i> )
<b>Veronica longifolia</b> (Speedwell)	Veronica hybrids	<b>Collate/Florel</b>		500 ppm spray x 4	Biweekly sprays did not significantly affect height, but increased branching and flowering of Icicle. Weekly sprays of 750 ppm x 4 caused excessive growth reduction and delayed flowering of Blue Bouquet ( <i>Michigan State Univ.</i> )
			<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	Good control of Red Fox ( <i>Univ. Georgia</i> )
2,500 to 5,000 ppm spray x 1 to 4	1 or 2 weekly 2,500 ppm sprays as necessary ( <i>Pilon 2006</i> ) Three 5,000 ppm sprays at 10-day intervals gave moderate control of Blue, while 4 weekly sprays gave excellent control of Blue Bouquet ( <i>Michigan State Univ.</i> )	North			
2,000 to 3,000 ppm spray	Effective on Red Fox ( <i>Ball Hort</i> )	Unspecified			
<b>Citadel/Cycocel</b>	Not responsive at 4,000 ppm spray x 1	Red Fox not responsive ( <i>Univ. Georgia</i> )	South		
		1,500 ppm spray x 3 to 4	4 weekly sprays gave good control of Blue Bouquet, while 3 sprays at 10-day intervals gave no control of Blue ( <i>Michigan State Univ.</i> )	North	
<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm sprays x 2	Red Fox responsive ( <i>Univ. Georgia</i> )	South		
	2,000 + 1,000 ppm spray x 1 to 2	Weekly sprays ( <i>Pilon 2006</i> )	North		
	2,500 + 1,000 ppm spray	Effective on Red Fox ( <i>Ball Hort</i> )	Unspecified		
<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol/Downsize (drenches only)</b>	Less than 40 ppm spray x 1	Red Fox sensitive; Test lower rates ( <i>Univ. Georgia</i> ). First Love sensitive: test lower rates ( <i>Virginia Tech</i> ).	South		
	30 ppm spray x 1 to 2	Weekly sprays ( <i>Pilon 2006</i> ); Three 60 ppm sprays at 10-day intervals were not effective on Blue, while 4 weekly 90-ppm sprays severely stunted Blue Bouquet ( <i>Michigan State Univ.</i> )	North		
	Not responsive at 80 ppm spray x 1	Pink Panther not responsive to spray, but moderate growth control with liner soak; Use lower drench rates; Drench applied at 10 fl. oz. per trade gallon pot; Drench volume and mg a.i. will vary with pot size ( <i>Virginia Tech</i> )	South		
	2 to 3 ppm liner soak x 1 Less than 4 ppm drench x 1				
	15 to 20 ppm spray	Effective on Red Fox ( <i>Ball Hort</i> )			
	30 ppm spray x 1 to 3 6 ppm drench x 1	Multiple spray applications may be necessary; Drench volume and mg a.i. vary with pot size ( <i>Syngenta Guide to Protecting Perennials 2009</i> )	Unspecified		
<b>Concise/Sumagic</b>	10 ppm spray x 1	Red Fox very sensitive ( <i>Univ. Georgia</i> )	South		
	5 ppm spray x 1 to 2	1 or 2 weekly sprays ( <i>Pilon 2006</i> ); Multiple spray applications at 15 ppm severely stunted Blue and Blue Bouquet ( <i>Michigan State Univ.</i> ); Effective on Mona Lisa Smile ( <i>Walters Gardens Culture Sheet</i> ); Effective on Magic Show ( <i>Proven Winners 2017 Perennials-Shrubs Guide</i> )	North		

CROP	PURPOSE	PRODUCT	APPLICATION RATE (PPM) X NUMBER OF APPLICATIONS*	PRECAUTIONS OR REMARKS	REGION
<i>Veronica spicata</i> (Spike speedwell)	To increase lateral branching	<b>Configure</b>	500 ppm spray x 4	Biweekly sprays increased branching of Icicle with moderate reduction in plant height ( <i>Michigan State Univ.</i> )	Branching
			600 ppm spray x 1 on liners	First Love liners had increased number of branches; No effect on finished plants ( <i>Virginia Tech</i> )	Branching
			300 ppm spray x 2 on liners	Goodness Grows treated twice (approximately 28 days after sticking and 2 weeks later) had 4 times the number of lateral branches; Shoot height was slightly reduced on liners; No effect on finished plants ( <i>Virginia Tech</i> )	Branching
<i>Veronica longifolia</i> (Speedwell) Veronica hybrids <i>continued</i>	To control plant growth	<b>Collate/Florel</b>	500 ppm spray x 1 on liners	No effect on growth or branching of liners or finished plants ( <i>Virginia Tech</i> )	South
			400 ppm spray x 4	Weekly sprays reduced growth and flower buds, but increased branching of Sunny Border Blue stock plants; Higher rates were phytotoxic ( <i>Michigan State Univ.</i> )	North
		<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	Multiple applications required; Apply at 10- to 14-day intervals ( <i>Univ. Georgia, Virginia Tech</i> )	South
			Tank mix	Tank mix of 2,500 ppm daminozide + 20 ppm paclobutrazol gave good control ( <i>Univ. Calif.</i> )	
		<b>Citadel/Cycocel</b>	750 to 1,000 ppm spray x 1	Higher rates cause persistent delay of growth in the landscape ( <i>Univ. Georgia</i> )	South
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Good control; Multiple applications may be required ( <i>Univ. Georgia, Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	20 ppm spray x 1	Very sensitive ( <i>Univ. Georgia</i> )	South
		<b>Concise/Sumagic</b>	10 ppm spray x 1	Very sensitive; Persistent reductions in plant growth continue in the landscape at 15 ppm; Drench applied at 4 fl. oz. per qt. pot; Drench volume and mg a.i. will vary with pot size ( <i>Univ. Georgia</i> )	South
			Less than 1 ppm drench x 1		
		<b>Topflor</b>	30 ppm spray x 1	Moderate control; Multiple applications may be required ( <i>Virginia Tech</i> )	South
<i>Vinca minor</i> (Lesser Periwinkle)	To control plant growth	<b>Dazide/B-Nine</b>	5,000 ppm spray x 2	Excessive reductions under nursery conditions; Reduce rate or frequency ( <i>Virginia Tech</i> )	South
		<b>Dazide/B-Nine + Citadel/Cycocel Tank Mix</b>	5,000 + 1,500 ppm spray x 1	Moderate reductions under nursery conditions; May require multiple applications ( <i>Virginia Tech</i> )	South
		<b>Piccolo/Piccolo 10 XC/Bonzi/Paczol</b>	40 ppm spray x 1	Moderate effect under nursery conditions; May require multiple applications ( <i>Virginia Tech</i> )	South
		<b>Concise/Sumagic</b>	15 ppm spray x 1	Moderate effect under nursery conditions; May require multiple applications ( <i>Virginia Tech</i> )	South
	To increase lateral branching	<b>Configure</b>	Not responsive at 1,200 ppm spray x 1	Sterling Silver was not responsive ( <i>Virginia Tech</i> )	Branching

### General Resources

Virginia Tech Floriculture website: [www.hort.vt.edu/floriculture/](http://www.hort.vt.edu/floriculture/)

Michigan State University PGR website: <http://flor.hrt.msu.edu/PGRs/>

North Carolina State University Floriculture website: [www.floricultureinfo.com](http://www.floricultureinfo.com)

Pilon, P. 2006. Perennial Solutions. Ball Publishing, West Chicago, Illinois

Latimer, J. and B. Whipker (eds.). 2010. Configure Product Information and University Trial Results.

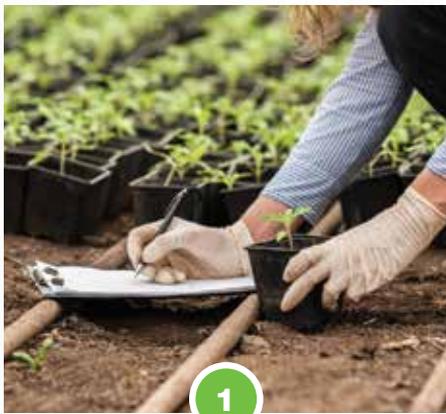
Fine Americas, Inc., Walnut Creek, California: <http://bit.ly/2yHKjYe> (for PDF download)

# ORNAMENTAL GROWERS ACCESS TOP-OF-THE-LINE PLANT GROWTH REGULATORS, TOOLS FOR DYNAMIC MARKETPLACE

*Fine Americas delivers innovation and quality to help growers improve productivity*

Ornamental growers face multiple business challenges ranging from labor shortages to an uncertain economy, ongoing technology and production changes to increased government regulations. And while at times it may feel overwhelming, these growers continue to look for, learn about and adopt ways to “do it better.” That is why Fine Americas, Inc., an industry leader in plant growth regulators (PGRs), is focused on delivering innovative, high-quality products and best-in-class research and tools to help growers improve plant quality and support their businesses in an ever-changing marketplace.

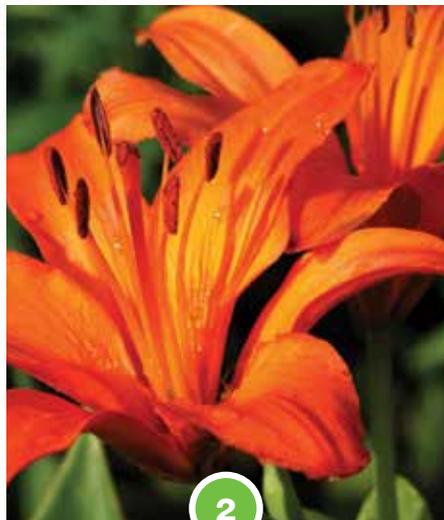
As the industry’s PGR leader, Fine Americas has always listened to what ornamental growers need most. Today, it continues to respond to growers’ needs by conducting ongoing research and bringing new products to market that will continue to make their operations even more efficient and profitable.



## The Importance of Research

To meet increasing demands in an ever fluctuating environment, ornamental growers constantly look for new and better ways to improve their plants. They must work to make plants more consistent in quality and marketability. Fine Americas not only delivers plant growth regulators, but also helps growers by listening to their needs and requests – and then identifying and developing new products, formulations, concentrations, expanded labels and new registrations to meet these needs. And that starts with research.

Fine Americas works with university researchers; and in that work, the company has helped to identify new uses for PGR products like Concise®, Fresco® and Piccolo® 10 XC (attributes such as improved plant uniformity and structure). Once products are developed and new uses are identified, the company works closely with university researchers and distributors to provide growers with the latest information.



## Commitment to Quality

Fine Americas puts quality first. It is certified to ISO 9001:2008 and maintains strict controls to ensure that all products are manufactured to the highest possible standards. From there, employees strive to maintain those standards throughout the entire supply chain.



## Grower Access to Information, Insight

Providing growers with access to university research is important, so Fine Americas provides this data and other PGR tools on its website. Resource materials include this yearly PGR guide, assorted educational videos and other valuable online tools.

Growers also may participate in quarterly training sessions to expand their PGR knowledge base while helping share the positive attributes of PGR usage in the ornamental community. Via training sessions and one-on-one visits with growers, Fine Americas takes pride in working with their customers to customize PGR recommendations and usage based on the customers’ growing practices, crops and other environmental factors – another aspect that sets the company apart from other ornamental PGR vendors.

For more than 30 years, ornamental growers worldwide have relied on Fine Americas to provide them the best of the best when it comes to PGRs. The company invests in its growers as it focuses on the development, manufacturing and marketing of PGRs for the greenhouse ornamental, tree growth and turf markets – as well as increasing the focus in the agricultural sector. This diversity is what makes Fine Americas stand out as a recognized center of excellence for PGR technology.

**To learn more about how  
Fine Americas can provide  
a custom PGR recommendation,  
or to find the nearest distributor,  
growers can visit  
[www.fine-americas.com](http://www.fine-americas.com) or call  
888-474-FINE (3463) toll-free.**

# Integrated Growth Regulation of Herbaceous Perennials

By Joyce G. Latimer, Virginia Tech University

There's a tremendous diversity of herbaceous perennial plant species being grown for both the retail and landscaping sectors of the industry. Growth regulation of these containerized plants is of particular concern. In production settings, as well as in retail locations, herbaceous perennials grown in pots tend to stretch and become leggy or simply overgrow their pots before their scheduled market date. These plants are less marketable and harder to maintain.

Plant growth regulators (PGRs) are chemicals that are designed to affect plant growth and/or development. Most of the PGRs used in the greenhouse or nursery are used to regulate shoot growth of containerized crops by inhibiting the production of gibberellins—the primary plant hormones responsible for cell elongation. Therefore, these growth retardant effects are primarily seen in stem, petiole and flower stalk tissues. Lesser effects are seen in reductions of leaf expansion, resulting in thicker leaves with a darker green color.

Plant growth retardants also increase the tolerance of plants to temperature and drought stress, as well as to the stresses of shipping and handling, thereby improving shelf life and extending plant marketability. Other benefits of using these PGRs in plant production include improved plant appearance by maintaining plant size and shape in proportion with the pot, and increased shipping capacity with the smaller plants.

Although there's much scientific information on using PGRs on ornamental plants, it's not an exact science. Achieving the best results with PGRs is a combination of art and science—science tempered with a lot of trial and error, and a good understanding of plant growth and development under your environmental and production conditions.

## Integrated growth regulation

For best results, PGRs should be handled as production tools, like water and fertilizer. PGRs should be an integrated part of your crop production cycle, used in conjunction with a number of non-chemical control options to manipulate plant growth, so well-proportioned, compact plants are produced. Selecting shorter-growing cultivars is often the first step available to growers for reducing the occurrence of overgrown plants. However, customer demand for specific color or growth form characteristics may limit your choices.

More so than with bedding plants, the response of herbaceous perennials to PGRs depends on the species and cultivar selection. However, in general, slow-growing or dwarf cultivars will require less PGRs than more vigorous cultivars. Some plant species or cultivars are responsive to specific PGRs, but not all PGRs. Research your crop, including its responsiveness to PGRs.

Environment and cultural practices can be manipulated in the greenhouse or nursery to reduce plant growth and consequently affect the need for chemical growth regulation. Root restriction can be used to control plant growth by utiliz-

ing smaller containers or by increasing the number of plants per pot. However, this method works well only when other production parameters, such as ample light—i.e., wide spacing and proper nutrition—are provided. Plants grown in small pots at close spacing will require more chemical growth regulation for adequate growth control than those receiving ample light.

Reducing or withholding water or fertilizer is a traditional method of controlling plant growth. Allowing plants to wilt slightly will lead to shorter plants, but excessive stress or drought stress of sensitive crops may have the undesirable effects of reduced plant quality and delayed flowering. Limiting the amount of nitrogen, or using high nitrate and/or low phosphorous fertilizers, may also help control plant height, but tends to produce thin, leggy perennials. Growers who tend to run their plants “dry” and/or “hungry” will need less PGRs to manage plant growth. Never apply PGRs to plants that are wilted, as the risk of phytotoxicity increases with stress.

Growing conditions affect plant height and PGR needs. Higher light quality tends to limit plant elongation, thus resulting in shorter plants. Low-light quality caused by inadequate spacing or crowding of the crop or too many hanging baskets overhead can lead to leggy plants. Light quantity also affects plant growth. Higher light levels improve plant growth and quality as well as branching.

Spacing will often determine the need for, and amount of, additional chemical control necessary for optimum height control. Lower temperatures can be used to reduce plant growth. This, however, may also reduce development, which can delay flowering, so you may need to adjust your crop schedules to hit your market window. Lower rates of PGRs are required for plants grown under lower temperatures. However, in general, higher rates of PGRs will be needed for plants grown outdoors under nursery conditions than for those grown in the greenhouse.



Good growers use all the tools at their disposal to grow the healthiest and most uniform crops they can.

Pinching can be used to improve the shape of the plant, increase branching and control excessive stretch. However, the labor costs of pinching and the subsequent delay in plant development may not make it an economically feasible option of controlling growth of many crops. The chemical branching enhancer, Configure, is effective on a wide variety of herbaceous perennials in both plug/liner and finished plant stages. Growers should test multiple applications to improve plant shape and reduce, or eliminate, pinching. To a lesser extent, ethephon (Collate, Florel) has been effective as a branching enhancer for perennial plants.

Optimizing plant growth control requires an understanding of the effects of environmental and cultural conditions on plant growth. Experience and on-site trials will allow you to combine chemical PGRs with a number of non-chemical control options to manipulate plant growth to produce high quality, compact plants.

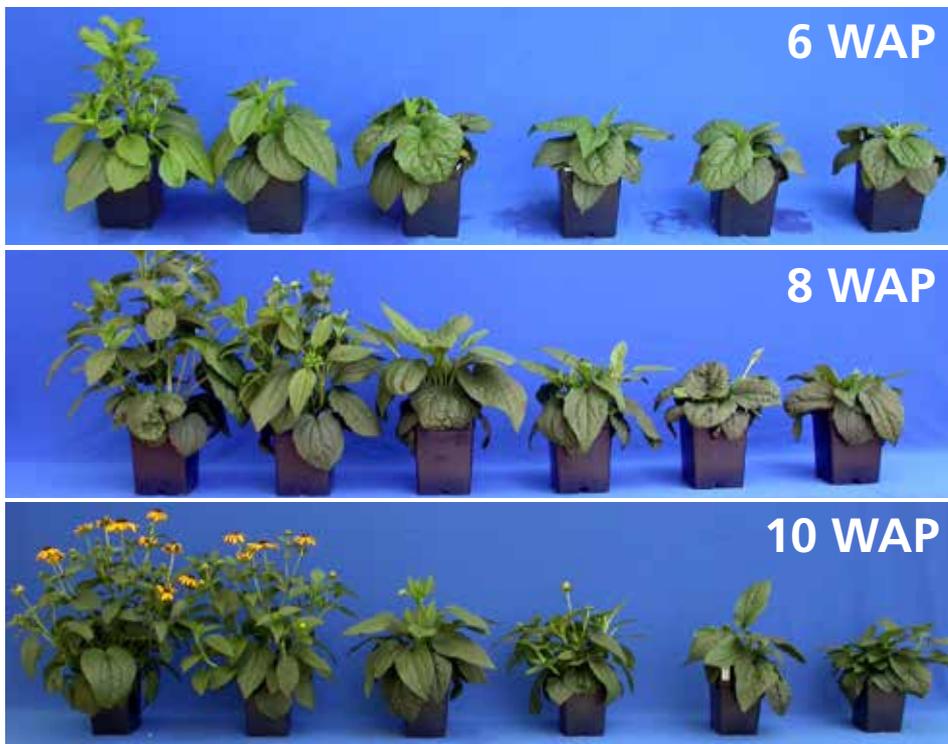
The PGR rate table (starting on page 14) contains results of university PGR research, published reports from growers, chemical companies and plant suppliers, as well as label recommendations for herbaceous perennials. These rates should be used as guidelines for your own trials. Adjust the rates based on your location (higher rates in the Sunbelt and lower rates in northern areas), growing conditions and cultural practices, and the vigor of your crop or cultivar. Keep records of your results, including details on the stage of development of the crop, fertilization and irrigation programs, and environmental conditions.

### Applying PGRs to herbaceous perennials

Generally, growth-retarding PGRs should be applied just prior to rapid shoot growth. For most spring-planted perennials, this is one to two weeks after transplanting a plug or liner, where the roots are established and the plant has resumed active growth. On pinched plants, apply PGRs after the new shoots are visible and starting to elongate. For overwintered perennials, apply the PGR shortly after new shoots emerge (2- to 4-in. tall) or laterals begin to elongate.

Under warm spring conditions, especially in a covered cold frame, these shoots can elongate very rapidly. This is where the art of plant growth regulation is most important. You must learn how your crop grows and when to intervene to obtain the desired results. Remember to note details of crop development in your records of PGR treatments. You must gauge when rapid elongation will likely occur and treat to counter it. Early intervention manages plant growth and quality better than late applications.

Liner soaks or media sprays can be very effective in controlling early growth of vigorous cultivars or providing



Liner soaks offer more flexibility than you think. How long do you need to hold your plants? Photos at 6, 8 or 10 weeks after treating Rudbeckia Goldsturm with a 2-minute liner soak at 0, 1, 2, 3, 4 or 5 ppm Concise (uniconazole).

season-long control. See labels for application guidelines. (Test rates suggested in the table starting on page 14.) These applications are intended to provide early control; higher rates and/or subsequent spray or drench applications may be necessary for season-long control.

Many growers, especially northern growers, prefer to use multiple applications of growth retardants to better control plant growth. A single application at a high rate early in the plant production cycle may be excessive if growing conditions aren't as good as expected. An early application at a lower rate provides more flexibility, but the tradeoff is the additional labor involved with multiple applications.

Be aware that excessive rates of many of these PGRs can cause persistent growth reductions in the container or even in the landscape. It's always a good idea to evaluate the long-term effects of your treatments by growing some out for yourself or talking with your customers. Be careful to avoid late applications, especially of paclobutrazol or uniconazole, as they may delay flower opening.

### Check plants

How well does the PGR really work? The only way to confirm the efficacy of a PGR is to leave a few representative plants untreated for comparison. These "check plants" offer a valuable insight into ways to adjust future PGR applications.

Integrating chemical growth regulators into your production practices will help control undesirable plant stretch and help ensure a well-proportioned, highly marketable crop. 5

# PGR Mixing Tool: PGR Mix Master Update

By Brian Whipker, North Carolina State University

A new 2.0 version of the PGR Mix Master app has been created by Dr. Brian Krug in partnership with Fine Americas. This free mobile app is web-based and can be used for calculating PGR mixing rates. PGR Mix Master can be used on any mobile device, computer or tablet with web access. It calculates PGR mixing rates for sprays and drenches for most of the common chemicals available for ornamentals.

(The old version of the PGR Mix Master [version 1.1.2] doesn't work on the newer Apple iPhone OS versions and you should delete the app. The version currently at the app store is the old 1.1.2 version and should not be used.)

The app works best with the Safari web browser. The icons may not appear the same in Chrome. The new app is available for access from the e-GRO website at <http://e-gro.org/mixmaster>.

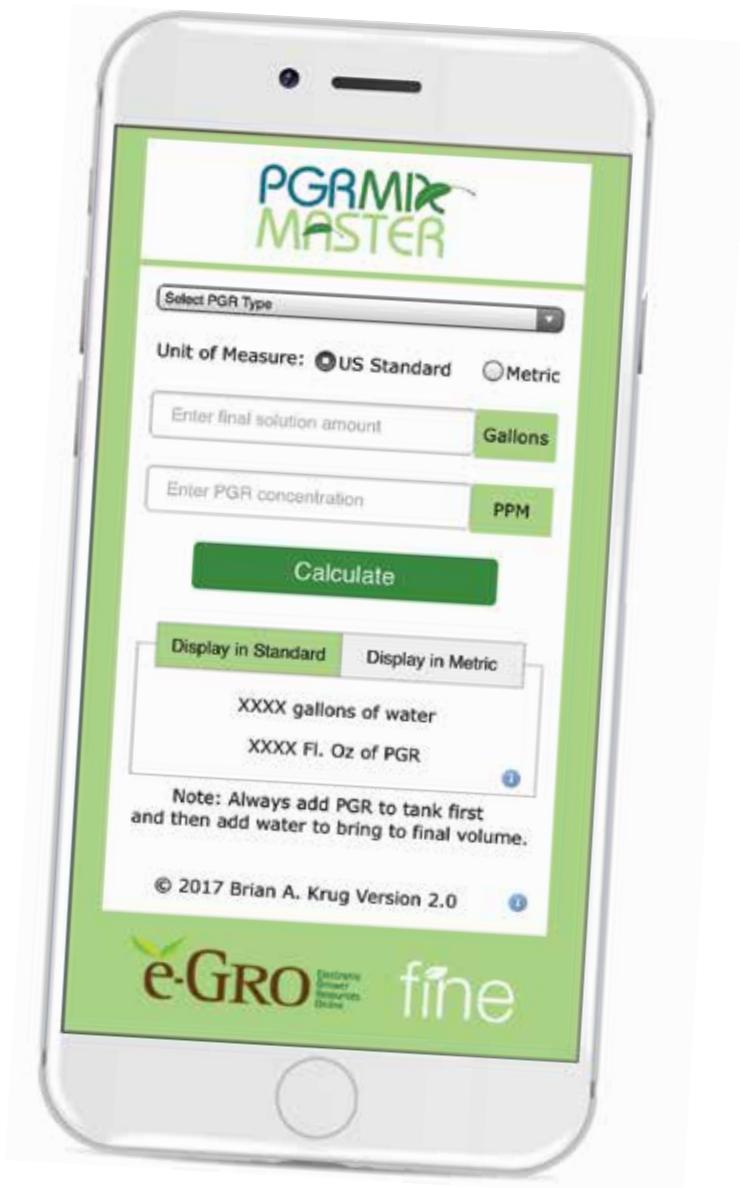
## Steps for calculating PGR mixing rates

1. When you open the e-GRO website ([e-gro.org](http://e-gro.org)), the MixMaster App is one of the icons displayed under the top e-GRO banner.
2. To calculate mixing rates, click on the icon to open the app.
3. From the pull-down menu, select the PGR that you'll be using.
4. Click on the unit of measure you want the results to be presented in (U.S. Standard vs. Metric).
5. Enter the volume of solution desired.
6. Enter the ppm concentration of the solution needed.
7. Hit "Calculate" and the app will display the required amount of PGR and water to use for mixing your PGR treatment.

It's that easy. The PGR Mix Master app is a great tool to quickly help you do the mixing math.

## Installing PGR Mix Master on your phone

1. Once the program is opened, at the bottom of your screen will be a box with an up arrow. Press it.
2. Press the "Add to Home Screen" button. (To locate the button, you may need to scroll to the right.)
3. When the new Add to Home screen pops up, click on the "Add" part at the upper right.
4. The PGR Mix Master app should appear on your phone screen for use. 📱



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- First and only 4% paclobutrazol formulation
- 1 quart = 2.5 gallons of Piccolo<sup>®</sup> or Bonzi<sup>®</sup>
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**Always read and follow label directions.** Piccolo<sup>®</sup> is a registered trademark of Fine Agrochemicals, Ltd. Bonzi<sup>®</sup> is a registered trademark of a Syngenta Group company. © 2017 Fine Americas, Inc.



# Collate Use Tips

By Brian E. Whipker, North Carolina University

In greenhouse floriculture production, Florel has been the go-to ethephon formulation for years. It's available as a 3.9% active ingredient solution. Fine Americas introduced Collate in 2013, which is a higher-concentration (21.7%) product. Greenhouse label uses for Collate include inducing flowering of ornamental bromeliads; avoidance of stem topple of potted hyacinths; height control of potted daffodils; and flower inhibition, increase in axillary shoot development and height control in a variety of ornamental crops. In order to get the most out of your Collate applications, below are some use tips to consider.

**Application parameters.** Collate breaks down and becomes inactive with water pH conditions greater than 6.1. While all of the registered ethephon products contain acidifiers, in areas with high levels of alkalinity, the alkalinity will need to be neutralized BEFORE mixing the solution. The ideal endpoint pH for a Collate solution is ~4.5 to 5.0. Be careful to avoid getting the solution pH too low, though—leaf phytotoxicity can occur with ethephon applications when the pH is below 3.

**Temperatures.** In addition, Collate activity is linked to active plant growth.

Applications made when temperatures are below 60F (15.5C) or higher than 95F (35C) will be less effective. Therefore, during times when temperatures are excessive, make applications either early in the morning or late at night.

**Timing.** When used to promote axillary branching, the plants should be well-rooted in the container. Typically, rooting to the side of the pot will occur within two weeks. Applications made before plugs or plants are well-rooted can result in retarded root development and stunted growth.

When used for prevention of early flowering, it should be noted that the last Collate foliar spray application should be made six to eight weeks prior to the intended sales date. Late spray applications will result in flower delay.

Suitable application windows should also be noted with stock plants. Ethylene can inhibit rooting, so applications shouldn't be made within seven days of harvesting cuttings.

**Avoid applications to stressed plants.** When used correctly, Collate applications will result in enhanced plant growth. Because ethylene produced by Collate is a stress enhancer, it's important to have the plants actively growing and not under suboptimal conditions (heat, drought, environmental or disease stress). Lower leaf yellowing typically occurs when Collate is applied to drought-stressed plants.

**Optimal concentrations.** For most plants, Collate spray rates are typically at 500 ppm. Complete spray coverage is required because Collate isn't

translocated within the plant. This is especially important for plants such as garden mums. Incomplete spray applications will result in uneven growth and flowering. Research has shown that drench and pre-plant liner soak application rates are lower—in the range of 50 to 250 ppm. At this time, none of the registered ethephon products, including Collate, are labeled for drench applications.

**Phytotoxicity.** Some cultivars have a greater sensitivity to Collate. Cupping and distortion of the young expanding leaves can occur. In addition, over-application can also result in distortion and leaf bleaching.

**Protective equipment and REI.** Collate is acidic, and because of this, it's a minor eye and skin irritant. That's the reason it has a longer REI of 48 hours. In addition, it should be noted that eye protection is required, along with protective gloves, coveralls, apron, shoes and headgear for overhead applications. A box of baking soda should be handy to neutralize the acidity of Collate in case it comes in contact with your skin.

In summary, Collate is effective in controlling excessive growth of many greenhouse plants. Collate is an excellent and cost-effective option for improving plant structure, preventing early flowering and controlling excessive plant growth. It's easy to see why Collate has become an essential component of the floriculture PGR toolbox. 🧰



# Dilution Table

## Formulated product per gallon of solution

PPM AI	Abide/ A-Rest (milliliters)	Dazide/ B-Nine (grams)	Citadel/ Cycocel (milliliters)	Collate (milliliters)	Concise/ Sumagic (milliliters)	Piccolo/ Bonzi/ Paczol (milliliters)	Piccolo 10 XC (milliliters)	Topflor (milliliters)	Configure (milliliters)	Fresco/ Fascination (milliliters)
0.5	7				4	0.5	0.05	0.48		
1.0	14				8	1.0	0.1	0.96		22.70
5.0	72				38	5.0	0.5	4.8		1.14
10	143				76	10	1.0	9.6		2.27
25	359				189	25	2.5	23.9		5.68
30	430				227	30	3.0	28.7		6.81
40	573				303	40	4.0	38.2		9.08
50	717			0.8	379	50	5.0	47.8	9.0	11.35
100	1433			1.6	758	100	10.0	95.5	18	22.70
200			6.5	3.1		200	20.0	191.0	36	
400			13	6.2					72	
500			16	7.8					90	
800			26	12.5					144	
1,000		4.5	32	15.6					180	
1,250		5.6	40	19.5						
1,500		6.8	48	23.5						
2,000		9.0	64	31.2						
2,500		11.1	80	39.3						
5,000		22.3		79.4						

A syringe is a convenient method for measuring out small volumes of chemical. They can be purchased at most drug stores. Note that on a syringe 1 cc equals 1 ml.

When mixing PGRs, great care needs to be given to accurately measure and apply the chemical. As always, the label contains the legal mixing information.

Foliar sprays require a uniform application to obtain consistent results. For foliar sprays, measure out a known amount of chemical, add it to a known volume of water and apply the spray to a known bench area. Most sprays are applied at 1 gal. per 200 sq. ft. of bench area.

Sprences are a way of supplying a greater dose of chemical as a foliar spray. Most sprences are applied at 1.5 gal. per 200 sq. ft. of bench area. This extra volume of water provides control by uptake by the leaves, stems and roots.

Drench applications vary by pot size and desired dose, so refer to the product label for exact mixing instruction. For drench applications, measure out a known amount of chemical, add it to a known volume of water and apply

a known volume of the drench solution to each pot. The volume of drench applied increases with the pot size (specifics are listed on each product label). For example, typically 3 fl. oz. of drench solution is added to a 5-in. pot, 4 fl. oz. to a 6-in. pot and 10 fl. oz. to an 8-in. pot. **GI**

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Our team has developed a collection of high-quality PGRs as diverse as your greenhouse.

Our PGR experts provide you with personalized, technical support and training.

We work with university researchers to bring you the latest PGR technology and developments.

Always read and follow label directions. Abide<sup>®</sup>, Citadel<sup>®</sup>, Collate<sup>®</sup>, Configure<sup>®</sup>, Concise<sup>®</sup>, Florgib<sup>®</sup>, Fresco<sup>®</sup> and Piccolo<sup>®</sup> are registered trademarks of Fine Agrochemicals, Ltd. Dazide<sup>®</sup> is a registered trademark of Fine Holdings, Ltd. © 2017 Fine Americas, Inc.

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