

Additional Notes on Plant Growth Regulators

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|-------------------------------------|--|
| ancymidol | Drench remains active (in plant) 3 - 4 weeks. |
| benzyladenine | Stimulates but does not cause branching or flowering. Spray remains active 7 - 10 days. |
| benzyladenine + gibberellins | Products can induce growth in "over-regulated" poinsettia. |
| chlormequat chloride | Drench remains active 1 - 2 weeks. May see leaf margin yellowing in 3 - 5 days. |
| daminozide | Apply foliar spray in early morning or late in the evening for best uptake. Do not tank mix or use with a copper-containing compound. |
| dikegulac-sodium | Apply early in crop production schedule. Transient chlorosis and slowed growth for 1 - 2 weeks. |
| ethephon | Remains active 6 - 8 weeks. |
| flurprimidol | Not recommended for fibrous begonia. Do not apply on plugs of begonia, pansy, salvia, or annual vinca. |
| gibberellins | Very active, start with lowest label rates. |
| paclobutrazol | Drench rates approximately 10% of spray rates. Drench remains active 3 - 4 weeks. Do not apply on annual vinca. Begonia, geranium, and viola are very sensitive. |
| uniconazole | Drench remains active 3 - 4 weeks. Can leach into groundwater. |

More PGR information is available in *Commercial Greenhouse and Nursery Production: Applying Plant Growth Retardants for Height Control*, Purdue Extension publication HO-248-W. Available from the Purdue Extension Education Store, www.the-education-store.com.

We appreciate the insight of James Barrett, Brian Whipker, Joyce Latimer, Fine Americas, OHP Inc., SePRO, Syngenta, and Valent Biosciences.

Things to Remember

Use products only as labeled. The labels indicate:

- Any known intolerances.
- Application timing.
- Any phytotoxic effects.

General Recommendations

- Use higher concentrations of PGRs when plant growth rates are high (due to high temperature and light).
- Know that plant response varies with plant species and cultivar.
- Mix and apply PGRs the same day.
- Do not apply PGRs to stressed plants.

Sprays

- Repeat applications at lower rates may be beneficial (except dikegulac-sodium).
- Make sure foliage is dry before application.
- Apply 2 qts/100 ft² spray volume (general recommendation) — chlormequat chloride and paclobutrazol may require 2–3 qts/100 ft² for larger plants.

Drenches

- Make sure substrate is moist, not wet — water before application.
- Decrease rates for sub-irrigation — substrate should be as moist as after a normal watering.
- Remember that as the percentage of pine bark in substrate increases, the effectiveness of ancymidol, flurprimidol, paclobutrazol, and uniconazole decreases. Test these products first with non-composted organic substrate components.

Container Sizes and Volumes for Drench Applications

| Container Diameter (inches) | Drench Volume | |
|-----------------------------|-------------------------------|--------------|
| | fl oz./container ¹ | mL/container |
| 4 | 2 | 59 |
| 5 | 3 | 89 |
| 6 | 4 | 118 |
| 8 | 10 | 296 |
| 10 | 25 | 739 |
| 10-inch basket | 15 | 444 |

¹Chlormequat chloride rates are 3,4,6, and 8 fl oz. per 4-,5-,6-, and 8-inch containers, respectively.

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Plant Growth Regulators for Greenhouse Production Pocket Reference

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This guide is a general reference to help greenhouse producers with chemical growth regulation decisions. It is not a substitute for reading product labels, which state lawful use and precautions.



How Do Growth Regulators Work?

Many plant growth regulators (PGRs) reduce internode elongation, which decreases plant height. These growth-retarding products contain one of these active ingredients:

- | | |
|----------------------|---------------|
| ancymidol | flurprimidol |
| chlormequat chloride | paclobutrazol |
| daminozide | uniconazole |

In other growth regulators, the active ingredients are plant hormones such as benzyladenine (BA) or gibberellins (GA), which affect growth (cell elongation and division) and development (flowering). Dikegulac-sodium products reduce apical dominance and increase branching.

Plant Growth Regulators for Greenhouse Containerized Ornamentals

| Active Ingredient (A.I.) | Notes | Trade Names | % A.I. and Formulation | Relative Activity | Spray (S) or Dench (D) Concentration Range for Annuals (ppm) | Application Method and Target | Spreader Sticker w/ Sprays | Hours to Overhead Irrigation | REI (hrs.) |
|--|---------------|---|------------------------|-------------------|--|---|----------------------------|------------------------------|------------|
| ancymidol | 1, 2 | A-Rest®, Abide® | 0.026 liquid | M | S: 6-66 D: 1-2 | spray, dip, drench leaves, roots | N | 0.5-1 | 12 |
| benzyladenine 6-BA | 3 | Configure® | 2.0 liquid | | S: 50-500 | spray leaves | Y | 6 | 12 |
| benzyladenine 6-BA +gibberellins GA ₄₊₇ | 3, 4, 5 | Fascination®, Fresco® | 1.8/1.8 liquid | H | S: 1-100 | spray leaves | Y | 12 | 4 |
| chlormequat chloride | 3, 4, 5 | Chlormequat E-Pro®, Citadel®, Cycocel® | 11.8 liquid | L | S: 800-1,500 D: 2,000-3,000 | spray, dip, drench leaves, roots | N | 6 | 12 |
| daminozide | 3, 4 | B-Nine®, Dazide® | 85.0 powder | L | S: 1,250-2,500 | spray leaves | N | 24 | 24 |
| dikegulac-sodium | 3, 4 | Augeo® | 18.5 liquid | M | S: 400-1,600 | spray leaves | N | 6 | 12 |
| ethephon | 3, 4, 5, 6, 7 | Florel® | 3.9 liquid | L | S: 100-500 | spray, dip leaves | Y | 12-16 | 48 |
| flurprimidol | 1, 2 | Topflor® | 0.38 liquid | H | S: 2.5-80 D: 0.25-4 | spray, dip, drench leaves, stems, roots | N | 0.5 | 12 |
| gibberellic acid GA ₃ | 3, 8 | Florgib®, ProGibb T&O®* | 4.0 liquid | H | S: 50-500 | spray leaves, stems | N | 2 | 4, 12* |
| paclobutrazol | 1, 2 | Bonzi®, Downsize®, Florazol®, Paczol®, Piccolo® | 0.4 liquid | H | S: 2.5-90 D: 1 | spray, dip, drench (Downsize® drench only) stems, roots | N | 0.5 | 12 |
| uniconazole | 3, 4, 6 | Concise®, Sumagic® | 0.055 liquid | H | S: 1-50 D: 0.1-2 | spray, dip, drench stems, roots | N | 0.5-1 | 12 |

Notes

- 1: Do not reuse containers or trays after application.
- 2: Agitate during application.
- 3: Do not apply through irrigation system.
- 4: Apply early in the morning or late in the evening because activity is related to temperature.
- 5: Avoid run-off when applying sprays.
- 6: Apply within 4 hours of mixing.
- 7: The ideal PGR solution pH is 5.
- 8: Best mixed with neutral or slightly acid water (pH < 8.5).