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Plant Growth Regulator Guide for Annuals Update

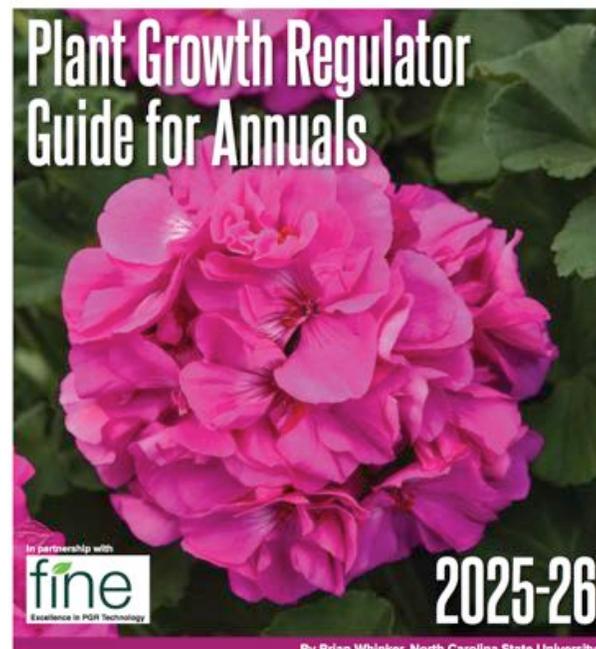
The 2025 version of the Plant Growth Regulator Guide for Annuals is now available, a project sponsored by Fine Americas. GrowerTalks subscribers will receive a copy in the mail or use the link in this Alert to obtain a pdf copy.

The 72-page Plant Growth Regulator Guide for Annuals publication has been updated for the 2025-2026 season. It contains a number of new articles.

Collate 2L is a higher concentration ethephon. It offers versatility for growers from branching enhancement to avoiding premature flower formation.

A research update is also provided for Collate 2L drench applications. The pending EPA approval for this drench method allows for an expansion of use. Prior work from over 10 years ago provided insights into the use of drenches, but until now the label registration was lacking. Once approved, this offers another cost effective tool for your PGR Toolbox.

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2025-2026 Annual PGR Guide

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PGR Use Tips

An Update on Using Collate 2L

By Brian E. Whipker, North Carolina State University

Collate 2L is a higher-concentration (21.7%) ethephon plant growth regulator that's widely used in floriculture greenhouse production. Ethephon products have been commercially available for agricultural use since being synthesized in 1965 and being registered in 1973. Ethephon helps avoid lodging in cereal crops, enhances boll opening in cotton, and is used for increasing yield in hybrid seed production, fruit initiation and fruit ripening.

In the 1990s, Dr. Peter Konjoian initiated floriculture trials that established commercial greenhouse protocols for use of ethephon for growth control (Figure 1). Since that time, ethephon has become one of the most popular plant growth regulators used in the greenhouse. In order to get the most out of your Collate 2L applications, here are some use tips to consider.



Figure 2. Applications of ethephon increase lateral branching.

Figure 1. Ethephon is an excellent plant growth regulator for producing compact plants. Ethephon foliar sprays of 2000, 1000, 500 and 0 ppm (left to right).



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Made of action. Ethephon has a unique way in which it works as compared to the other anti-gibberellin plant growth regulators. When applied as a foliar spray, ethephon enters the stomata and degrades into ethylene gas and 2-hydroxy ethyl phosphonic acid. The ethylene gas acts as a growth regulator by limiting apical dominance and thus stimulating lateral branching. With the increase in axillary shoot development the plants are more compact (Figure 2). This can result in labor savings by avoiding the need to pinch a crop. Ethephon can also be used to avoid early season flowering on many greenhouse crops. Ethylene results in an abscission layer at the base of the flower or bud that results in flower drop (Figure 3). This helps keep plants vegetative. With foliar sprays, ethephon applications should be avoided six to eight weeks prior to sales of flowering plants. Ethylene can also inhibit rooting, so avoid applying it to mother stock prior to taking new cuttings.

Suitable species. Greenhouse label uses for Collate 2L 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.

Optimal foliar spray concentrations. For most plants, Collate 2L spray rates are typically at 500 ppm, but can vary between 250 and 1,000 ppm depending on the plant (Figure 4). Complete spray coverage is required because Collate 2L 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 (Figure 5).

Upcoming drench recommendations. Research starting back in 2014 has shown that drench applications are an effective way to control excessive plant growth. The application rates are lower—in the range of 50 to 250 ppm when applied early and slightly higher when applied mid-season. At this time, none of the registered ethephon products, including Collate 2L, are labeled for drench applications. This is about to change, as Fine Americas has a label update pending EPA approval for Collate 2L's use as a substrate drench. Once approved, Fine Americas will post the revised use label on their website, which

PGR Use Tips

Collate 2L Drenches: Highlighting Experimental Results

By Brian E. Whipker, North Carolina State University

The active ingredient in Collate 2L is ethephon. The PGR has been a primary go-to product for the greenhouse industry for the past 30 years. Historically, greenhouse growers have focused on foliar sprays as the primary way for application because it's cost-effective and easy to apply.

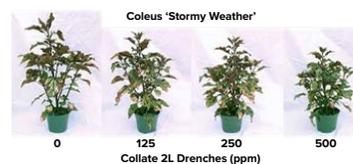
Drench PGR applications have mainly focused on the triazole-related chemicals such as paclobutrazol, uniconazole, acynolidol and flurprimidol. While chlormequat chloride has a drench label, effective doses aren't economical. Historically due to substrate tie-up, daminozide is listed as not being suitable for drenching.

Ethephon was also not listed as a possible drenching PGR, but its suitability wasn't investigated. This changed with work published by a team lead by Dr. Bill Miller at Cornell in 2012 in which they trialed drench rates of up to 500 ppm. Overall, they found that drench rates of around 100 ppm worked well on 24 bedding plant species trialed. Additional work by Virginia Tech University researchers in 2015 found that ethephon efficacy was greater at substrate pH of 4.5 than 7.0. This was due to the slower evolution of ethephon to ethylene at lower pH, which allows for greater plant effect.

Iowa State University researchers explored how the timing of ethephon applications controlled growth. Of course, control increased as rates increased from 0, 50, 100 and 200 ppm. In addition, greater growth control occurred if the applications were

made five days after transplant than on days 10, 15 or 20. Flowering delay also was more likely if higher rates were applied early. All these results provided the foundation for the use of ethephon as a drench PGR.

Missing component. The primary challenge with using ethephon as a drench is that it lacked a use label. No ethephon formulation offered on the U.S. market has a drench label. Fine Americas initiated research work five years ago



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The guide is also the primary resource for best management practices for the use of PGRs. The bulk of the guide is the extensive listing of PGR application recommendations in the 43-page table. Articles also provide an overview of the PGRs available to the U.S. market, additional benefits of PGRs, plus use tips for Piccolo 10XC, Advocate, Fresco, Florgib 4L, and Abide, plus production information for Succulents with Fresco drenches.

The goal for the Plant Growth Regulator Guide for Annuals is to provide a single resource of PGR information for greenhouse growers. An electronic version is available from the Fine Americas website. Subscribers to GrowerTalks magazine will also be sent a paper copy with their next issue of the magazine. Appreciation is expressed to Fine Americas for sponsoring the publication.

[2025-2026 Annual PGR Guide Link](https://www.growertalks.com/pdf/PGR_GUIDE_2025-26_Annuals.pdf)

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