

# GROWERTALKS

## Cover Story

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## BMPs for PGRs

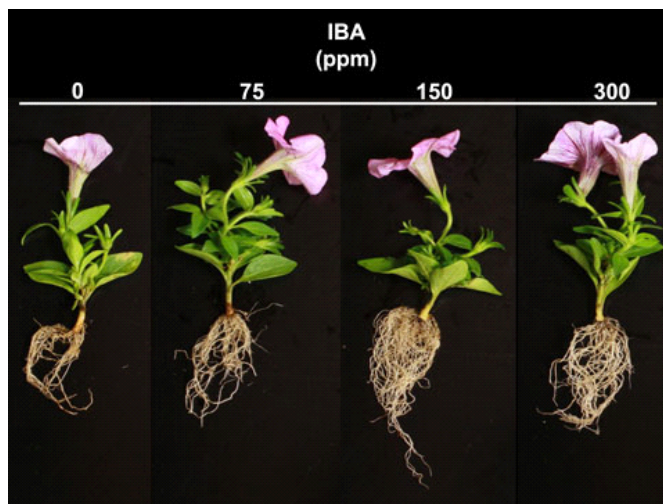
*Christopher J. Currey*

Some people will say that plant growth regulators (PGRs) can't make a bad grower a good grower. And I certainly agree. But I would quickly counter that they can make a good grower a great one, while also saving labor and simplifying production. There are a number of opportunities to integrate PGRs into plug and liner production, including enhanced rooting, reduced leaf senescence, improved branching and (in some instances) delayed flowering—and there's a PGR to help accomplish each of these goals.

### Auxin

The central aim when producing liners is rapid and uniform root growth and development. Total time from sticking to a pullable and transplantable liner is reduced with enhanced rooting. Auxins—including indole-3-butyric acid (IBA), indole acetic acid (IAA) and naphthalene acetic acid (NAA)—are the most commonly used auxins, with IBA being the most prevalent. These auxins, suspended in talcum powder or an alcohol-based solution, are typically applied by dipping the end of cuttings in them prior to sticking.

While certainly not an onerous task, when millions of cuttings are being stuck, dipping adds labor. Newer IBA formulations, including both granular (K-IBA) and liquid (Advocate), are specifically for spraying onto foliage instead of dipping. Spraying IBA onto cuttings after they've been stuck when the trays are out in the greenhouse can have serious labor savings compared to the more traditional dip applications. Although auxin is naturally transported from the shoot tip to the base of cuttings, applying a solution volume greater than 2 qt. per 100 sq. ft. (up to 6 or 8 qt. per 100 sq. ft.) can further enhance the rooting. For dipping cuttings, the appropriate concentrations are categorically lower than those traditionally used for talc- or liquid-based dips, so be sure to follow label suggestions.



*Figure 1. Foliar sprays of indole-3-butyric acid (IBA) not only promote root growth and development, but they also save labor when replacing the traditional dip used to apply rooting hormones.*

### Benzyladenine & gibberellic acid

While the goals of cutting producers and hopes of greenhouse growers are that healthy cuttings freshly harvested

are shipped in a timely manner and under proper conditions, things don't always happen as we hope or plan for. One of the most frequent victims of subpar cutting health and/or shipping conditions are zonal geraniums, and the lower leaf yellowing on cuttings during propagation is a tell-tale sign something went awry. There's nothing to be done about leaves starting to senesce. However, applying PGRs (Fascination, Fresco) combined with benzyladenine (BA) and gibberellic acid (GA) after cuttings are stuck reduces lower-leaf yellowing on zonal geranium cuttings.

To have the best success with BA+GA4+7 and geranium cuttings, there are a few tips to follow in order to avoid adverse impacts on rooting. First, foliar sprays containing 2 to 4 ppm BA+GA4+7 is a good range of concentrations to look at; higher concentrations may excessively suppress rooting. While some sprays are applied to "run-off," avoid excess solution, as it can run down the cutting to the base where roots will develop. Additionally, it's best applied to cuttings about 24 hours after sticking and placed in the propagation environment, allowing leaves to "flatten out" from the upright position they're in when coming out of bags from shipping to better absorb more PGRs. Finally, using a rooting hormone also helps counteract any inhibiting effects of the BA+GA4+7.

## Gibberellic acid inhibitors

Controlling stem extension and, ultimately, plant size with growth-retarding PGRs is one of the most useful approaches to controlling appropriately sized plants. All gibberellic acid (GA) inhibitors labeled for use for greenhouses can be used, including ancymidol, chlormequat chloride, flurprimidol, paclobutrazol and uniconazole.



There are a few considerations when using GA inhibitors on young plants. First, be mindful of overregulation during propagation, especially when young plants are being shipped out to other growers. We've all seen the carry-over effects of too much growth retardant applied in propagation—plants just sitting in their containers during finishing, not budging. Some of the GA inhibitors with a shorter residual activity, such as daminozide and chlormequat chloride, are useful in avoiding over-regulation.

*Figure 2. Lower-leaf yellowing during propagation, especially on zonal geraniums, can be problematic. Applying a combination of benzyladenine and gibberellic acid can suppress leaf yellowing and keep foliage green.*

Those PGRs with stronger activity (flurprimidol, paclobutrazol and uniconazole) have a big benefit for young plants because of their root activity—liner or plug dips. By placing plug or liner trays into a solution covering at least half the height of the root zone until the solution is saturated (~30 seconds to two minutes), young plants are "pretreated" with growth retardant prior to transplanting. This, in turn, is a labor-saving approach that can also simplify finishing. Not only is it much easier to treat 1,000 rooted cuttings by dipping 10 trays than it is to treat 1,000 4-in. pots spaced out in the greenhouse, it improves the treatment uniformity across the crop when compared to post-transplant sprays.

## Benzyladenine

Enhanced branching is a benefit for most containerized greenhouse crops. For most crops, we enhance branching by either pinching or shearing crops. When we remove the growing point, we remove auxin—the hormone that helps maintain apical dominance and suppresses branch development. Although pinching, be it by hand or with the aid of mechanization, is an effective approach to improving branching, it's a labor-intensive process. As a cytokinin, BA promotes branching without pinching by counteracting auxin and diminishing apical dominance. Although BA is

applied in combination with GA, it also has a use as a standalone PGR (Configure) to improve branching of many annual and perennial bedding plants. Foliar sprays can be especially useful for young plants during Stage 4 of both liner and plug production (Toning).

## Ethephon

If there ever was a proverbial Swiss Army Knife of PGRs, ethephon would be it. Though it doesn't slice and dice, ethephon has a number of different effects on plants: it increases branching, suppresses stem elongation, aborts flowers and enhances fruit ripening. Although it can be used as a growth retardant, like anti-GA compounds, ethephon is most useful for delaying premature flowering and improving branching. With all of the breeding for "flower power" that breeders have done, ethephon can be helpful for knocking off buds or flowers on cuttings during propagation.

Like ethephon, it can also be useful for enhancing branching in lieu of mechanical pinching or shearing. One word of caution when using ethephon during liner production: Ethephon is antagonistic to root growth and development, which is exactly what we're trying to promote when rooting cuttings. If you decide to apply ethephon during liner production, be sure to carefully manage the amount of solution applied with foliar sprays to minimize (or better, eliminate) runoff, which could get into the substrate, suppress rooting and delay finishing the liners.



*Figure 3. Premature flowering can be problematic, especially on vegetatively propagated cuttings. Ethephon foliar sprays can be used during propagation during the latter part of Stage 3 (root development) or during Stage 4 (toning).*

Think about your young plant production and look at the strategies outlined in this article. I suspect there's at least one new approach you can try while growing young plants this coming growing season. Whether it's fine-tuning your production techniques for plugs and liners for use in house or for shipping across the country, PGRs are tools you can use. **GT**

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