GROWERTALKS

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Using Multiple PGRs: What You Need to Know

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Plant growth regulators are a crucial part of greenhouse production today. Most growers utilize one PGR, and occasionally sometimes two; however, a few growers are even using three regularly. It's not something to jump into unprepared, though. What do you need to know in order to successfully combine and even tank mix more than one PGR?

Know your modes

Experts say the first step is understanding how each PGR works. Without that, it's tough to determine which PGRs to use when and for what. Added to that, each has its own quirks in application and activity that are critical for developing a PGR program.

Pictured: Calibrachoa is one of the plants that benefits from combining multiple PGR chemistries.

"When growers have used plant growth regulators for some time, they'll typically begin to consider tank mixing as part of their PGR program," said Dudley Dabbs, Eastern Regional Manager for Fine Americas. "Whether that's two products or even three, they begin to experiment to determine the best combination to attain their desired results. To be truly successful in tank mixing, growers must understand the different modes of action available in PGRs."

Tom Costamagna, director of horticulture at Young's Plant Farm in Auburn, Alabama, and a longtime user of multiple PGRs, agrees.

"When combining multiple PGRs, a grower must understand the chemistries in regard to mode of action, method of application, absorption time, recommended uses, activity sites, etc. to determine the desired response when combining multiple chemicals," he said. "There are no two greenhouses alike, and to determine the best results, it takes time in trialing multiple rates, genus/species and the various environmental conditions one experiences within a season and/or year to perfect consistent results."

Benzyladenine (BA) products like Configure help enhance flower set and promote branching. You'll want to ensure complete application coverage, since BAs don't readily move through the plant. The best time to apply? During active growth, when the plant is most receptive.

Daminozides work by blocking the pathway for the plant to produce gibberellins (GA), the hormone that causes cell

elongation. In contrast to BAs, daminozide products like Dazide move very fast through plants. Because of this mobility, they break down quickly with foliar sprays—the application strategy of choice for daminozides.

Like BAs, ethephon phosphonic acid promotes branching, but in a different way, and it can promote flower bud abortion. How? When plant tissues absorb them, ethephon products release ethylene to impact plant growth. You'll want to apply ethephon products like Collate via foliar spray; they aren't labeled for soak or drench.

We mentioned each product has quirks you'll get to know the longer you use them. For ethephon, that's pH.

"Buffer your spray tank water and aim for about 4 to 5 for your pH," said Dudley. "Ethephon isn't as stable at higher pH numbers."

Now you're ready to mix

When it's time to tank mix PGRs in the greenhouse, trial, and trial again is the rule. Tom knows that first hand. He began using a combination of three PGRs together nearly 15 years ago and he'll tell you he's still refining the technique.

Tom sees several advantages to combining PGR modes of action in a layering strategy to build on their benefits.

"Ultimately, a combination spray of plant growth regulators will reduce stem elongation, increase branching and not delay flowering significantly when applied timely," he said. "Tank mixes (e.g., spray combos) achieve multiple desirable effects simultaneously while lowering application cost compared to sprayed chemicals separately."

In addition, you have the benefits of not having to pinch vegetative cuttings like calibrachoa, chrysanthemums and many perennials.

"These combination sprays for many of the commonly produced annuals and perennials will eliminate a pinch mechanically by machine or physically by a person," said Tom. "By eliminating this step, it avoids a crop being pinched too high or too low, opening a wound in this tissue to be compromised by a pathogen or the transmission of a virus, potentially impacting not only the crop being pinched, but others if the appropriate sanitation practices are not in place."

Another advantage for Tom is the reduction of labor you see when combining multiple PGRs.

"You're touching the liners less, which takes out the potential for human error, yes, but also is less time spent on each tray," he said.

Instead of potentially three PGR applications, you're performing one application with a tank mix of two, or in his case, sometimes three.

Plus, tank mixing gives Tom the predictability he needs for high-level productivity. He has a target look and habit for his end product, and using multiple PGRs lets him consistently and reliably produce that full, bushy, dense plant for which he's aiming.

"High quality and predictable timing are the names of the game here," he said.

Fifteen years ago, Tom began to seek a solution for the exceptional vigorousness of Lantana New Gold and he used it as his control product. Not only is it vigorous, but it traditionally requires multiple pinches to keep it contained and controlled. He was already using daminozide (Dazide), ethephon (Collate) and benzyladenine (Configure), but he wondered what would happen if he could multiply their benefits.

At the time, he was using Collate for branching and flower delay, Dazide to make plants green and compact, and Configure for promoting branching. He still can't say there's a cookie-cutter approach—he still tweaks it depending

on which crop he's producing and which PGRs he's combining.

"In my eyes, the biggest learning curve is understanding application environment [cool and cloudy versus hot and dry], which will impact absorption time and the dose rate response from tank mixed applied," said Tom.

He likens PGR application to "The Goldilocks Principle." In the story of "The Three Bears," Goldilocks had three experiences: a meal (porridge), a rest (chair) and sleep (bed). In all three experiences, she didn't like the extremes (too hot/cold, too big/small, too hard/soft), but she did find "just right" in all three experiences.

"So when applying PGRs standalone or in combination, the desired absorbtion time is critical, as some prefer to be wet longer, while others can dry quickly and be quite effective," Tom explained. "The key is to apply them in combination 'just right,' which may require pulling shade curtain in some circumstances or rinsing them off if a period of time passes—for example two hours—and the foliage is still wet from the application."

Rates, of course, depend on greenhouse location. If you're north of the Mason-Dixon line, he says your rates could vary dramatically from his rates down in Alabama. Having supervised greenhouse production in Illinois and Virginia before moving south, he speaks from experience. For daminozide (Dazide), rates can vary from 1,250 ppm to 3,750 ppm; ethephon (Collate) may range from 250 ppm to 750 ppm, and benzyladenine (Configure) could require as little as 200 ppm and as much as 500 ppm.

Areas farther south with a lot of heat and intensity (Texas, California, Florida) will likely be on the higher end of those ranges. Up north and in the Midwest, you'll likely be on the lower end of the numbers, at least until temperatures increase and the days start to get longer.

Temperature can also affect PGR performance, as well as rate, he said.

"I prefer applying my PGRs before 9:00 a.m.," he said. "For example, in the dark, cool months especially, ethephon might cause tip abortion if you apply it in the late afternoon."

When applying ethephon, you'll also want to steer clear of high temperatures, Dudley adds, in order to maximize effectiveness and activity.

"In those warmer months, make early morning or late evening applications, so you're doing your PGR applications under 79F," he suggests.

In addition, when figuring rates, Tom suggests looking at the relationship to volume. During summer, you may want more volume if you're growing larger-sized mums, but you may not even need 200 gallons per acre for plug production.

"Volume will dictate the response as much as rates will," said Tom.

Time is your friend and so are your PGRs. With just a little time and tenacity, you'll be tank mixing like a master grower. As Tom said, "It's like refining a recipe; you find the sweet spot in those rates."

For more details on PGRs, refer to the *GrowerTalks* PGR Guides on annuals and perennials. **GT**

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