

Increasing Height of Chrysanthemum with PGR Drenches

How can growers control growth on garden mums when plants flower early and stem elongation slows?

BY CATHERINE WHITMAN, NATE DURUSSEL AND ERIK RUNKLE

Growing plants to a target height is a constant challenge. Often growers need to suppress stem elongation to reduce finished plant height; however, in some situations, they need to increase the height of their crop. This can be necessary if growth retardants are over-applied, or if environmental conditions have caused the plants to be too short.

During production of fall garden chrysanthemums, it is not uncommon for plants to become induced to flower too early. While chrysanthemums respond strongly to photoperiod, temperature also influences flower induction. If temperatures during the summer are relatively cool, especially at night, some mum varieties will form flower buds even if photoperiods are long. Since stem elongation slows dramatically once flowers begin to form, plants can be shorter at flower than desired.

One technique to increase stem length is to make an application of a product that contains gibberellic acid (GA). Several products that contain GA (with or without benzyladenine, BA) are registered for use on floriculture crops, including Fresco from Fine Americas. Fresco contains 1.8 percent GA 4+7 + 1.8 percent 6-BA.

We have conflicting information about the efficacy of GA when applied as a substrate drench. Traditionally it's been thought that GA is only effective when applied to the plant shoots. However, some growers have reported positive responses when GA is applied as a drench by repeated foliar sprays delivered from booms, or when applied directly to the media, without contact with the foliage. Drench applications could also be useful on other potted flowering crops such as poinsettia, as well as on bedding plants, potentially offering a uniform plant response without negative effects on flowering.

Our objective was to determine the efficacy of Fresco as a substrate drench to increase height of garden chrysanthemum, and compare its effectiveness to that of spray applications.

EXPERIMENTAL PROTOCOL

We obtained well-rooted chrysanthemum liners of 'Barbie Lavender', 'Chelsea Coral', 'Eventide Dark Bronze', 'Gigi Coral' and 'Jacqueline Pearl' from C. Raker & Sons on July 21, 2016. Liners

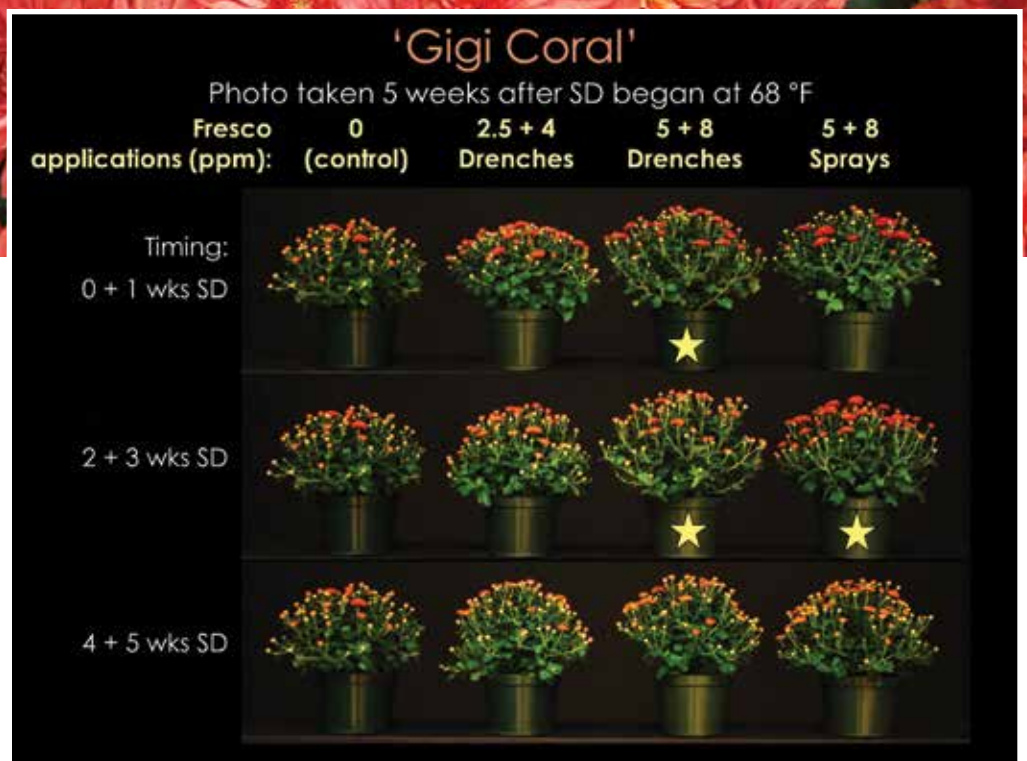


Figure 1. Chrysanthemum 'Gigi Coral' received two applications of Fresco one week apart. Plants in the treatments marked with a star were taller at first flower than untreated (control) plants.

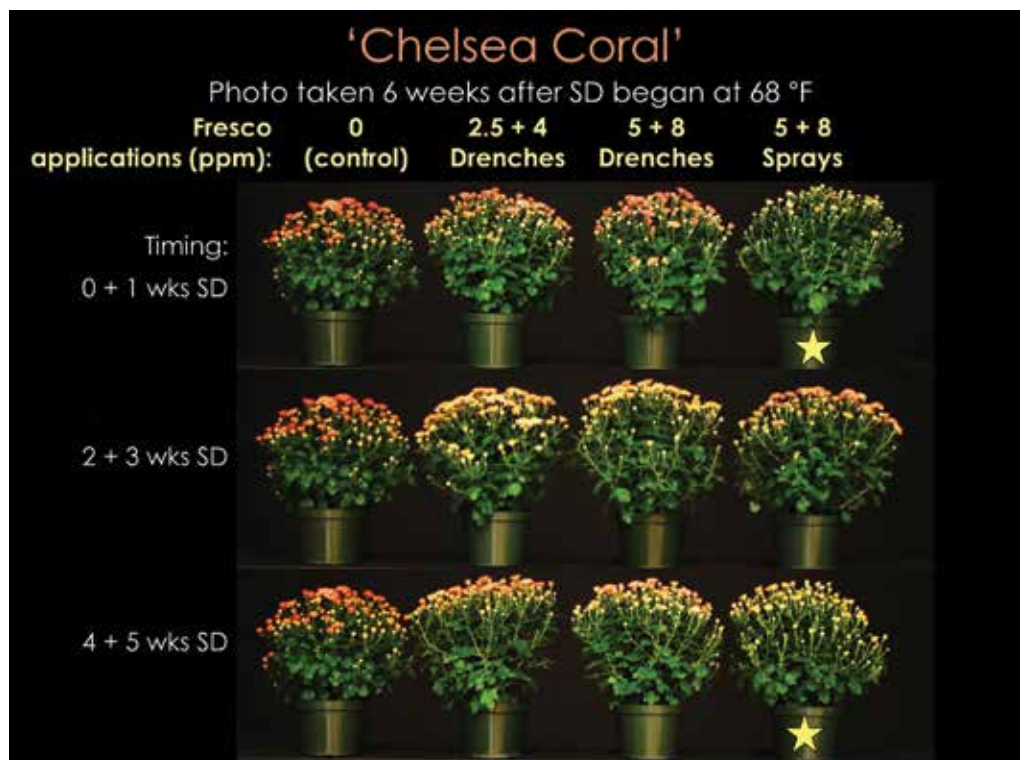


Figure 2. Chrysanthemum 'Chelsea Coral' received two applications of Fresco one week apart. Time to first open flower was delayed on plants in treatments marked with a star.

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RESEARCH

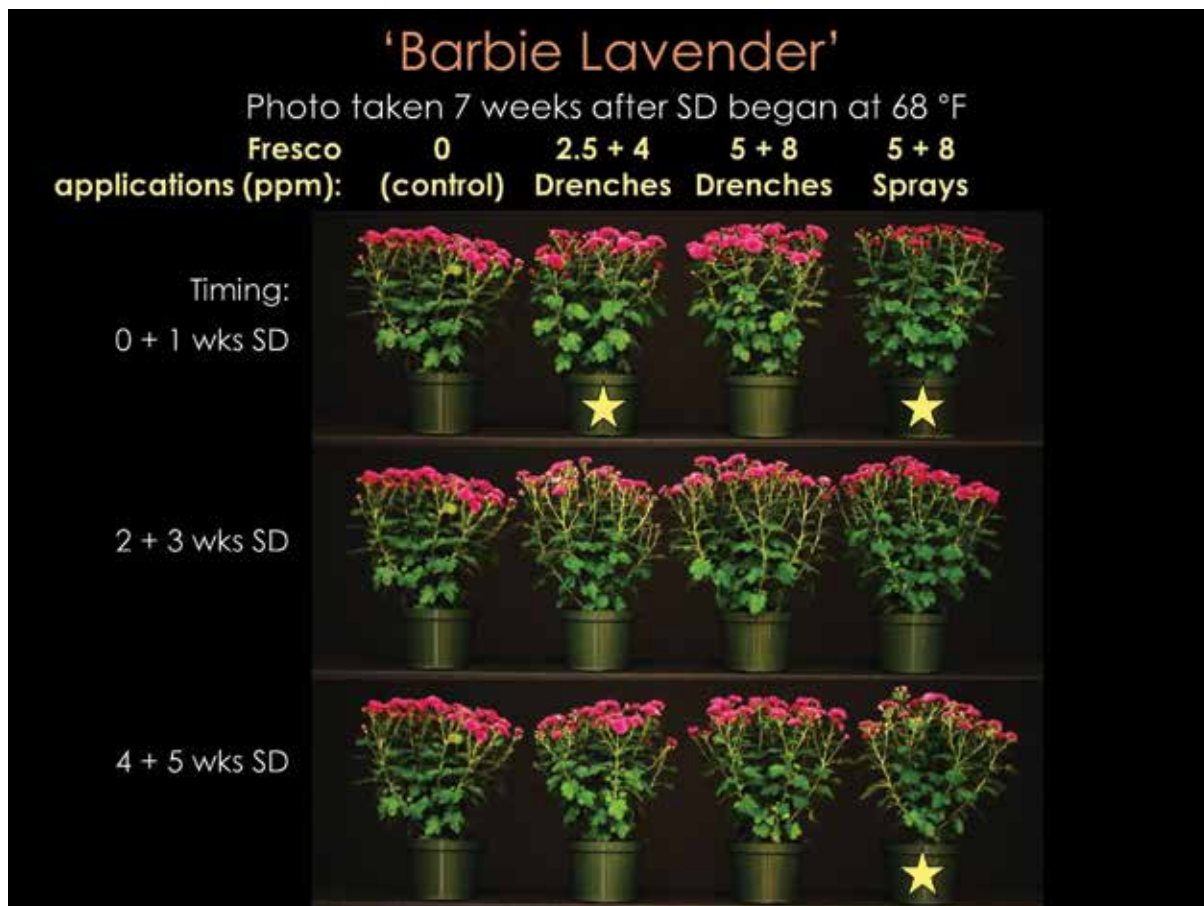


Figure 3. Chrysanthemum 'Barbie Lavender' received two applications of Fresco one week apart. Plants in the treatments marked with a star had fewer inflorescences showing color when the first flower opened, than untreated (control) plants.

were transplanted into 5-inch pots filled with a standard peat and perlite medium on July 27. On Aug. 1, all were pinched. Plants were irrigated as necessary with reverse osmosis water supplemented with a water-soluble fertilizer containing (ppm) 125 nitrogen, 12 phosphorus, 100 potassium, and other macro- and micro-nutrients (MSU RO Water Special; GreenCare Fertilizers, Inc.).

Plants were maintained at a constant 68° F, with a 16-hour long day and supplemental lighting from high-pressure sodium lamps. On Aug. 30, we initiated nine-hour short days (SD) by pulling blackout cloth at 5 p.m. and opening it at 8 a.m. daily.

Ten plants were assigned to each treatment, and we planned to give plants a single application at three different times: when SD began, after two weeks of SD or after four weeks of SD. We observed little response after the first treatment, so we modified the initial protocol, adding applications at higher rates to be made one week after each initial treatment. Thus, all treated plants received two applications one week apart:

Application rates and methods:

- None (control)
- 2.5-ppm drench (at zero, two or four weeks after start of SD) followed by 4.0-ppm drench one week later

Table 1. Responses of garden chrysanthemum to drench or spray applications of Fresco.

Cultivar	Application method	Height increased?	Time to flower delayed?	Inflorescence # decreased?
'Barbie Lavender'	Drench	✓	no	✓
	Spray	✓	✓	✓
'Chelsea Coral'	Drench	no	no	no
	Spray	no	✓	✓
'Eventide Dark Bronze'	Drench	✓	✓	no
	Spray	✓	no	✓
'Gigi Coral'	Drench	✓	no	no
	Spray	✓	no	✓
'Jacqueline Pearl'	Drench	no	no	✓
	Spray	no	no	✓

Figure 4. Effects of a single spray of Fresco at 50 ppm, made four weeks after SD began. Untreated plants of 'Barbie Lavender' (left) and 'Eventide Dark Bronze' (right) are on the left; treated plants are on the right. Photo was taken three weeks after spray was applied.



Spotlight on Innovation: Candy Tops Snapdragon Series

Q&A with Ken Harr



Ken Harr

Over the years Sakata has introduced its latest and greatest innovations at California Spring Trials, and 2017 was no different as Sakata introduced the Candy Tops snapdragon series. This new semi-dwarf series is in a height and size category that only Candy Tops currently fills. Candy Tops will grow in the garden 9-11" tall, although finished height will depend on the time of year and location. With upright and sturdy stems, and plenty of blooms, the Candy Tops series delivers constant color throughout the season.

We sat down with Ken Harr, ornamental product technical manager, to talk about how Candy Tops, with its unique genetic background, will dominate the snapdragon market.

GPN: How are Candy Tops different from other dwarf snapdragons?

Ken Harr: Candy Tops snapdragons top off strong, dominate central stems and many secondary laterals. They can be produced under low light and short day conditions and still develop a beefy, strong habit that holds up to shipping and the rigors of retail. The strong habit of Candy Tops comes from the intermediate snapdragon genetics that have been incorporated into their genetic bloodline. Unlike Candy Tops, traditional dwarf snapdragons can be difficult to produce under the low light and short days of winter. Traditional dwarf snapdragons flower on the end of weak lateral branches and are very floppy and unappealing at retail. However, with Candy Tops growers can avoid this unappealing 'floppiness' and offer their customers full, strong plants that look great and outperform others in the garden.

Because of their unique breeding, Candy Tops also have more florets per stem than many traditional dwarf snapdragons. And due to the strong central stem, Candy Tops snapdragons have the capability to flower several weeks after planting. Additionally, strong side branching allows the plants to continue to bloom for several weeks and well into the summer.

GPN: What are some production recommendations for Candy Tops snapdragon?

KH: Spring bedding plant season is the ideal time for growing, selling and planting Candy Tops. Snapdragons are a cool season crop that can withstand cool temperatures into the low 40s, so Candy Tops can be one of the first crops shipped into retail stores right alongside pansies

and violas. The fall season, because of its cooler night temperatures, is another great time to grow Candy Tops, especially in milder winter climates of the south and far west.

Compared to other commercial dwarf snapdragon series, Candy Tops is four to seven days later to flower, and one to two weeks earlier than intermediate series. This, of course, will depend on local growing and environmental conditions.

Research has shown that more flowers are produced on all snapdragons when they are exposed to day length up to 14 hours. Exposing the plants to 14-hour days, particularly during the late winter or early spring months, will get the maximum flowers per stem.

GPN: What about plant growth regulators, can they be applied?

KH: While conducting several trials throughout the U.S., we have found that utilizing temperature control, sound moisture and feed management will keep Candy Tops in the ideal height range for finishing and shipping. However, daminozide (B-Nine), or paclobutrazol (Bonzi) can be applied at the lower recommended label rates, as trials have shown that Candy Tops are very responsive to PGR applications, even more so than some dwarf snapdragon series. You don't need to spend as much money or apply as much PGRs on Candy Tops as you do on some of the other series. That's a cost saver.

Snapdragons can be grown successfully with a pH range of 5.5 – 6.0 and a soil EC of 1.0 – 1.5. Always read and follow label directions.

GPN: What is the ideal pack size and pot size for producing Candy Tops?

KH: Because Candy Tops is taller and fuller than other dwarf snapdragon series, Sakata recommends large cell packs, like a 606 or 1801. Ideally we suggest 4-inch or 10-cm pots because that is when you get to see its true capabilities – its height, its spread, and its branching. However, because of its full, branching habit, it can also be finished in quarts or gallons with multiple plants per pot.

Seed is now available through your preferred broker-distributor. Candy Tops currently offers five bright colors of Red, Orange, Rose, Yellow and White, as well as a Mix.

For information about Candy Tops Snapdragon, visit www.sakataornamentals.com or contact your local Sakata distributor.

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- 5.0-ppm drench (at zero, two or four weeks after start of SD) followed by 8.0-ppm drench one week later
- 5.0-ppm spray (at zero, two or four weeks after start of SD) followed by 8.0-ppm spray one week later

Overhead drenches were made so the solution did not contact the foliage, but the growing medium was saturated, and the solution reached the bottom of the pot. The surfactant CapSil was added to all spray treatments. The spray was a heavy application (3 quarts/100 ft²) so the product was applied to initial runoff.

After SD began, heights were measured every week until the first flower opened on each plant. On that date, we recorded plant height and number of flower buds (inflorescences) showing color. We also calculated the height increase over the initial height of each plant.

RESULTS

Plant height. Fresco applications increased height of 'Barbie Lavender', 'Eventide Dark Bronze' and 'Gigi Coral'; treated plants were 1-1.5 inches taller at first flower than untreated plants (Figure 1). Sprays and drenches were similarly effective when applied at the same rate. We observed slightly more stem elongation with the higher rate of drench compared to the lower rate. Treatments were most effective when applied within three weeks of starting SD. Height of 'Chelsea Coral' and 'Jacqueline Pearl' was not affected by the treatments.

Time to flower. 'Gigi Coral' and 'Jacqueline Pearl' began flowering after about five weeks of SD while the other varieties started flowering after six to seven weeks. Time to first flower was delayed by one to five days in 'Barbie Lavender' and 'Chelsea Coral' plants that received the earliest or the latest spray

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treatments (Figure 2). Drenches influenced time to flower in only one instance: there was a slight (two day) delay in flowering of 'Eventide Dark Bronze' treated with 5+8 ppm drenches at two and three weeks after the start of SD.

Inflorescence number. Flower bud numbers were variable, and reduced by some treatments, but all plants were attractive and suitable for market. The earliest spray treatments resulted in fewer inflorescences on every cultivar (Figure 3). 'Barbie Lavender' and 'Jacqueline Pearl' plants treated with the earliest drench treatments also had fewer inflorescences than untreated plants.

CONCLUSIONS


Our results confirm that Fresco drenches, applied without contact to the foliage, can increase stem elongation in at least some varieties of garden mums (Table 1). Drenches offer potential advantages compared to spray applications such as reduced likelihood of a delay in flowering, and more visible flower buds when the first flower opens.

During this trial, we noticed another possible disadvantage to sprays: plants exhibited a very slight, temporary foliar chlorosis. To see how plants would respond to an excessively high rate, we treated some with a 50 ppm spray (Figure 4). As expected, both elongation and chlorosis were increased. Generally, though, the chlorosis was transient and didn't negatively affect plant marketability.

For the best response, we suggest applying at least 5 ppm of Fresco within three weeks of starting SD. Plant responses are generally visible within a week, and if more elongation is desired, another application can be made. Our rates resulted in height increases of 1-1.5 inches; if applying later in the crop, or a bigger increase is needed, higher rates may be appropriate.

As with any plant growth regulator application, it's best to perform small-scale trials to determine appropriate concentrations for your situation and environment. Be sure to read the product label and follow application instructions and worker protection standards. Plants

drenched through repeated sprays, such as from a boom, may need lower concentrations because of Fresco uptake by leaves, shoots and roots. Similarly, drench applications through subsurface irrigation may be more effective than drenches applied overhead.

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