

Grower 101:

Bulb Soak Basics

Soaking bulbs in PGRs before planting can be an effective means of height control for spring bulb crops.

**By Brian Krug,
Brian Whipker
and Ingram McCall**



Sumagic preplant bulb soaks on 'Star Gazer' lilies. From left to right: 0, 5 and 10 ppm Sumagic.

According to the National Gardening Association, in 2002 29 percent (31 million) of all U.S. households grew flower bulbs, and overall flower bulb sales were estimated at \$1.2 billion. Whether sales are from bulbs, cut flowers or potted bulbs, this sector is sticking around. William Miller at Cornell University, Ithaca, N.Y., is constantly performing research on bulbs, and he recently found some interesting results when testing the efficacy of bulb dips. We thought it would be useful to pair this research with some bulb soak basics from researchers at North Carolina State University, Raleigh, N.C. So, keep reading the next 17 pages for the most up-to-date research on PGRs and bulbs.

Bulb crops are an important segment in the yearly rotation for a greenhouse. They help fill the gap between the poinsettia and bedding plant seasons. The short cropping time and limited amount of bench space required for a large amount of pots add to the advantages of producing flowering bulbs.

A concern many of the bulb crops is stem stretch during postharvest. Although this does not directly affect

us as growers, it does have a major impact on the quality of the pot when it is in the hands of the consumer.

Recommendations have been made for the application of foliar sprays, substrate drenches and preplant bulb soaks using various PGRs for height control. Foliar sprays are easy to apply, but with the small amount of leaf area present at application it is often ineffective. Substrate drenches can be effective for postharvest height control, but the amount of labor required for

Figure 1. Suggested Preplant bulb soak rates.

	Flurprimidol (Topflor)	Ancymidol (A-Rest)	Paclobutrazol (Bonzi, Piccolo, Paczol)	Uniconazole (Sumagic)
Tulip	10-25 ¹ mg per liter for 10 minutes	n/a	50 mg per liter for 10 minutes	10 mg per liter for 10 minutes
Caladium	NR @1.25-40 mg per liter for 10 minutes	n/a	NR @ 2.5-40 mg per liter for 10 minutes	SR @ 1-10 mg per liter for 1-5 minutes
Hyacinth	10-25 ¹ mg per liter for 2-10 minutes	n/a	100 mg per liter for 10 minutes	20-40 ¹ mg per liter for 10 minutes
'Tete a Tete' narcissus	30 mg per liter for 10 minutes	n/a	400 mg per liter for 10 minutes	NR @ 5-10 mg per liter for 10 minutes
'Dutch Master' narcissus	20 mg per liter for 10 minutes	n/a	200-400 mg per liter for 10 minutes	NR @ 5-10 mg per liter for 10 minutes
Oriental lily	25 mg per liter for 10 minutes	4 mg per liter for 30 minutes	100-200 mg per liter for 5 minutes	5 mg per liter for 10 minutes

Some of these recommendations are based on previously published trials or on the product label.

NR=No response at the rates trailed

SR=Suggested rate to begin experiments; label lists no specific recommendation

¹Concentration depends on cultivar response

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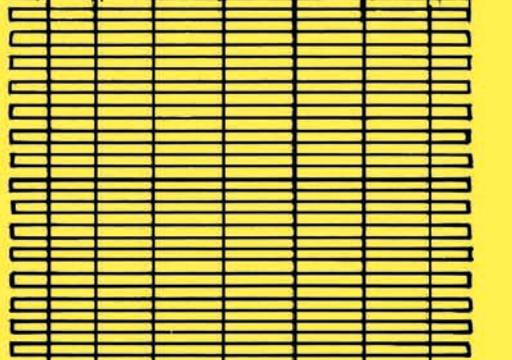
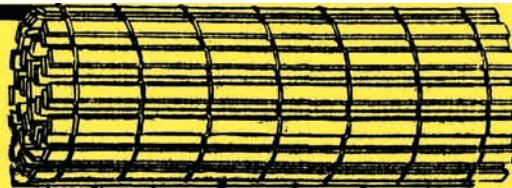
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Top: 'Pink Pearl' hyacinth bulbs soaked in 20 ppm in consecutive batches. From left to right: untreated control, 1st batch, 10th batch and 20th batch. **Bottom:** Topflor preplant bulb soaks on 'Prominence' tulips. From left to right: 0, 10, 15 and 20 ppm Topflor.

application may be prohibitive. Preplant bulb soaks have shown promise for an effective, easy-to-apply PGR treatment, but information about application concentrations and protocols is limited and sometimes vague.

At North Carolina State University, Raleigh, N.C., we have been trialing preplant bulb soaks to better understand how to use the different PGRs on a wide variety of bulb crops. The following will answer some common questions about how to apply preplant bulb soaks based on this research.

Bulb Soak Q&A

Question: How long before potting can I soak the bulbs?

Answer: In our trials, we soaked hyacinth bulbs the day of, the day before and seven days before planting. After soaking we returned the bulbs to proper storage conditions until we potted. We found no differences in the amount of height control provided by any of the treatments. So

the procedure allows some flexibility as to when you can soak the bulbs.

Question: How many bulbs can I soak in a given amount of solution?

Answer: We soaked 100 hyacinth bulbs, five at a time, in 1 liter of solution. When we finished soaking the last set of five bulbs there was not enough solution to soak another batch, but we found no difference in the height control from the first to the last batch. On average, each bulb utilized 4-8 ml of solution, meaning it would take approximately 370 bulbs to use up 1 gal. of solution; however, 370 bulbs will not fit in 1 gal. of solution at the same time. Based on our results, the solution will be used up before any loss of efficacy. Research conducted with hybrid lilies and paclobutrazol at Cornell University, Ithaca, N.Y., found similar results.

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Topflor preplant bulb soaks on 'Tete a tete' narcissus. On the left, untreated control, on the right 25 ppm (10 days after anthesis).

labels and other recommendations suggest up to a 1-hour soak. Most of our experiments were for 10 minutes. We also tested bulb soak lengths of 1, 5, 10, 20 and 40 minutes on hyacinth. After two minutes plant height was the same. We recommend soaking for at least two minutes, but don't worry if a customer calls and you have to walk away for few minutes while the bulbs soak. Other bulbs may vary. Freesias generally require a longer time (60 minutes) because of the outside tunic. We had excellent results with 10-minute soaks on tulips, narcissus, dahlias, 'Star Gazer' lilies and Easter lilies.

Question: How can I dispose of unused solution?

Answer: You cannot simply pour leftover pesticides and PGRs down the drain; it is illegal and too expen-

sive to waste. This may not be an issue if you accurately calculate how much total solution you will need (approximately 370 hyacinth bulbs per 1 gal. of solution). If you do have solution left over you can apply it as a substrate drench to another crop. We applied leftover soak solution to 'Pacino' pot sunflowers and saw no difference in control as compared to freshly prepared substrate drench solution.

Question: Does efficacy vary with cultivar?

Answer: Yes, and no...let your experience be your guide. We've given a range of recommendations for a number of species (see Figure 1, page 44). To determine which end of the range to use for a particular cultivar consider its vigor. Notoriously tall cultivars will need concentrations on the high end of the range, while

Preplant Bulb Soak Procedure

Step 1. Unpack and inspect bulbs, and store them in a cool, dry location until treatment. Remove packing material (peat, sawdust, etc.) from bulbs prior to treatment with a PGR preplant bulb soak.

Step 2. Mix the appropriate amount and concentration of solution, see Figure 1, page 44, for suggested concentrations. As always, wear appropriate protective clothing.

Step 3. Soak batches of bulbs in small quantities to ensure all bulbs are sufficiently submerged in the solution. Quantities should be relative to the amount of solution mixed.

Step 4. Lift the bulbs from the solution, and allow the solution to drain back into the container.

Step 5. Wait at least one hour prior to potting the bulbs.

Step 6. Pot as usual, making sure your potting media is pre-moistened to prevent the need to heavily water in the pots, which can wash the PGR solution off the bulbs.

Step 7. Continue normal forcing schedule for the crop.

the less vigorous cultivars can use the lower concentrations. Conduct a few trials of your own to determine what concentrations work best for you and your production system.

Question: Does it matter what the temperature of the solution is?

Answer: In our experiments we found that extremely cold (46° F) or extremely warm (89° F) water reduced the efficacy of paclobutrazol and flurprimidol on hyacinth bulbs. With temperatures between 60 and 75° F we found consistent, acceptable height control.

Question: Do preplant soaks delay plant emergence or flowering date, or limit root development?

Answer: When we saw any delay, it generally was less than two days when optimal concentrations were used. The plants bloomed and grew normally. An exception was dahlias — the soaks delayed flowering by one week.

We have found that preplant bulb soaks have been an effective addition to the PGR toolbox for controlling the height of a number of bulb crops. Using these guidelines, you can begin to use preplant bulb soaks with confidence in your own production system. As with any new procedure, we recommend testing preplant bulb soaks on a small quantity of pots before you treat your entire crop. There is a limited amount of greenhouse height con-

trol of hyacinth, tulips and narcissus. You will need to conduct postharvest trials to evaluate the efficacy on these crops. Differences in 'Star Gazers' height were easy to evaluate in the greenhouse. **GPN**

Brian Krug is a graduate research assistant, Brian Whipker is associate professor and Ingram McCall is research technician at North Carolina State University. Krug can be reached at bakrug@unity.ncsu.edu

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