

GROWERTALKS

Features

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Hold, Please!

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One of the hallmarks of the spring greenhouse season is that nobody knows what's coming. While we traditionally associate the spring weather patterns and their effect on crop production and subsequent consumer demand with the need to "hold" crops, this past year has probably found you holding crops for reasons beyond weather. Regardless of why crops need to be held, it's a challenging place to find yourself as a greenhouse producer (Figure 1). While there's no single magic solution, there are several different options you can employ.

Temperature

One of the first strategies that should be employed for holding plants is to lower the air temperature and grow plants cooler. The average daily temperature (ADT) controls the rate of crop growth and development. As air temperature increases from the base temperature (the temperature below which growth and development stops) to the optimal temperature (the temperature at which growth and development is fastest), growth rates increase. Conversely, as air temperatures within this range are lowered, growth and development slows.

We can use cooler air temperatures to "put the brakes" on crops. However, the degree to which we can lower air temperatures to slow development depends on the cold tolerance of crops. Since the base temperatures vary with each crop, so does sensitivity to cooler temperatures (Figure 2). For cold-tolerant species—such as argyranthemum, dianthus, marigold, osteospermum and pansy/viola—air temperatures can be dropped lower than for cold-intolerant species like angelonia, celosia, pentas, vinca and zinnia.

Fertilizers

Just as we can try to stop the rate of plant development by lowering the air temperature, we can suppress excess growth by changing fertilizer practices. While restricting phosphorous is an effective strategy to control plant size, this isn't as effective for short-term or temporary growth control. Rather, the best way to hold back plant growth is to reduce the amount of nitrogen applied to crops.

As the nutrient most abundant in plants, restricting the amount provided during holding can help keep plant size in check. However, always remember to maintain attractive and marketable foliage on your crops when using nutrient restriction. If nitrogen restriction occurs for too long a time period, lower leaves may start turning yellow from a nitrogen deficiency. The other nutrients to remember include magnesium, as well as the suite of micronutrients, as these contribute to leaf greenness as well. Consider applying magnesium sulfate (i.e., Epsom salts) and/or water-soluble micronutrient packages to maintain green foliage while still withholding growth-promoting nitrogen.

PGRs

When growth control is needed, some of the most obvious tools available are plant growth regulators (PGRs). Since PGRs are commonly used in propagation and finishing to control growth, it makes sense that they would also be useful for holding crops. However, there are a few considerations to keep in mind when formulating a PGR-hold application strategy.

Start with selecting the right active ingredient. Avoid any ethylene-generating PGRs (Florel, Collate) for holding flowering annuals and perennials. While it may suppress growth and help hold plant size, the ethylene also can cause flower abortion and reduce marketability. Additionally avoid active ingredients with long residual activity, such as uniconazole.

In addition to selecting active ingredients that don't have the longest residual activity, select lower concentrations for "hold" PGR applications than you may normally use in production. Finally, focus on foliar sprays for PGR application. While substrate drenches are an effective way to apply many PGRs, the residual activity of a drench application is much longer compared to a spray application.

Always keep in mind these "hold" PGR applications should be very transitory in their effect, especially for annual and perennial garden plants that are going to be transplanted into landscapes and containers.

Irrigation

Another effective growth-controlling approach for holding plants is to reduce the amount of available water or "grow dry." When plants are well-watered, the turgid cells help promote cell elongation and expansion, pushing growth. By reducing substrate moisture, the chronic drier conditions hold back plant growth from optimal rates.

Managing irrigation can be used throughout propagation to finishing to affect plant growth. Reducing irrigation pairs well with other holding strategies, complimenting cooler air temperatures, restricted mineral nutrients and PGR applications. On its own, restricting irrigation may not be able to hold your plants, but it will work well, providing an additive effect to other methods.

One final note of caution: It's easy to grow dry early in a crop cycle, when plants don't have an established, extensive root system and well-developed shoot(s). However, when holding plants that are at the end of their crop cycle and are fully developed, you'll need to keep a closer eye on plants to avoid growing too dry and causing damage.

Trimming

Finally, sometimes the best laid plans of mice and greenhouse growers don't work out and plants simply get too big. In these instances, there may be an opportunity to trim the crop or cut it back, and allow it to regrow and become marketable again (Figure 3). Try to avoid this strategy if at all possible. Not all crops are well-suited to trimming.

For example, plants with terminal flowers (at the end of stems) aren't great candidates for trimming—all the flowers are removed when sheared and the regrowth can have a "bad haircut" look. Alternatively, plants with axillary flowers (arising at the base of leaves) tend to be more well-suited for trimming, as they can regrow flowers more quickly to become marketable again.

Two other considerations to keep in mind: First, even if machines and specialized equipment are used, trimming is a labor-intensive proposition. Second, tools need to be sanitized throughout the process to minimize any unwanted disease spread.

The take-home

In an ideal world, we would never have to hold crops, but how many "ideal" springs can you count? I'd bet you aren't even using your second hand! None of these tips can serve as a "silver bullet" for your holding needs, but when a few of these tactics are combined, the additive effect will help you salvage both your crops and sales. **GT**



Figure 1. Holding plants is essential to maintain a marketable appearance, whether ornamental or edible. While chemical plant growth retardants couldn't be used on this cilantro, there are a variety of environmental and cultural techniques that can be used to hold plants. Figure 2. Cool air temperatures can slow down crops for holding, but species vary in their sensitivity to cold temperatures. This basil was exposed to temperatures below its tolerance and you can see the resulting damage that renders the plant less- or un-salable.

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Figure 3. While trimming may not work for all crops, it can be effective for "resetting" growth of certain crops to maintain their marketability.

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