Save Water With Increased Irrigation Intervals

Are you growing bedding plants in large containers? Consider conserving resources by changing the way you water.

By Terri Starman and Cecilia Guo

Growing bedding plants in 5-inch or larger containers, rather than smaller containers and flats, is an upward trend in the industry. A different approach to watering bedding plants in larger containers could help you reduce water usage and save on labor, with an increase (or at least no loss) of production and shelf life quality.

Our study, funded by the American Floral Endowment, showed several benefits of reducing water usage by increasing the interval between watering during greenhouse production for some cultivars of bedding plants grown in 6½-inch containers.

Details of the Study

It is a common practice to irrigate greenhouse crops to container capacity (CC), which is defined as the amount of water content held in the root substrate after excess water has drained away by gravity. This percentage of root substrate moisture content (SMC) at CC varies with the type of root substrate. The challenge becomes how dry to let the root substrate get before rewatering.

Our study analyzed the effects of two ranges of drying down of SMC before rewatering — postproduction quality and economic value of bedding plants grown in 6½-inch containers during greenhouse production. Our hypothesis was that a wider range of SMC during production would lower production costs, control growth, and better acclimate plants to the postproduction environment resulting in better visual quality during shelf life.

We grew eight cultivars of bedding plants, including Angelonia ‘Angelface Blue,’ Coleus ‘French Quarter,’ Heliotrope (Heliotropium) ‘Simply Scentsational,’ Petunia ‘Colorworks Pink Radiance,’ Lantana ‘Lucky Flame,’ Impatiens (Sunpatiens) ‘Compact Hot Coral,’ I. ‘Sunpatiens Spreading Lavender,’ and Salvia ‘Red Hot Sally II.’

We purchased the plants as liners or plugs, transplanted them into 6½-inch round plastic containers, and allowed 14 days for root establishment before initiation of watering treatments. The plants grew in a peat/perlite root substrate and were fertilized with each irrigation using 200 ppm 20-10-20. Throughout production, using Watchdog 1000 micro stations and SM100 WaterScout sensors from Spectrum Technologies, we monitored SMC and watered plants with one of two drying intervals: (1) narrow range from CC (54% SMC) to 40%; or (2) wide range from CC to 20% SMC repeatedly as needed. The first drying interval was much like the conventional way of watering in which the root substrate is kept evenly moist at all times, and the second drying interval allowed the root substrate to dry to the point that the plants were starting to show symptoms of water stress.

The plants grew in the greenhouse until they were marketable (six to nine weeks). Then we loaded them onto shipping carts wrapped with plastic and kept them in the dark for 24 hours to replicate shipping conditions. Afterward, the plants were placed back on the greenhouse bench and shaded.
with 50% shade cloth for two weeks of simulated shelf life. During simulated shelf life, plants were watered with plain water only when they began to wilt.

**Benefits From a Wide Range Drying Interval**

Species varied in their response to reduced water usage (i.e., increasing the time interval between watering). Here is a breakdown on how the different cultivars responded to the wide range (54% to 20%) drying interval.

**Better quality plants acclimated to shelf life: Angelonia, Petunia, and Salvia**

These three species really benefited from reduced water usage. Plant height or width was reduced without the use of plant growth regulators. Flower number increased either during production or shelf life, with less loss of flowers during shelf life and darker green leaves. Angelonia and Petunia had increased root growth and less water stress during shelf life. Two to four watering events and up to 2 quarts of water per plant were saved during production and shelf life combined.

**Detrimental Effects on Plant Quality**

Plant width was decreased for both *Impatiens 'Sunpatiens Compact Hot Coral'* and *Lantana 'Lucky Flame',* and the Impatiens had more root growth. However, both cultivars had a greatly reduced number of flowers at harvest and during shelf life, and lantana had yellow leaves.

**Saved watering events without detrimental effects on quality: Coleus, Heliotrope, and Impatiens 'Sunpatiens Spreading Lavender'**

In this group, only Impatiens had a reduction in plant width. Heliotrope was the only one that had increased flowers at harvest, and the only one in this group that had more roots. Impatiens had the same number of flowers regardless of the drying interval and, of course, coleus is not grown for its flowers. All other measures of quality were not affected by the wide range (54% to 20%) drying interval. One to two watering events were saved, but there was no savings in the amount of water except one quart of water per plant for heliotrope.

**Take-Home Messages**

These results show that production costs can be reduced, and production and shelf life quality can improve by increasing the interval between watering just to the point of plant wilting rather than keeping root substrate constantly moist. The reduction in costs is a result of the reduced bench space required (which lowered the residency costs expressed by overhead cost per square foot per week), the decreased amount (and associated costs) of water, and the reduced irrigation-associated labor (e.g., to check and repair emitters).

For all eight cultivars, the total number of irrigation events was less with a wide range drying interval of 54% to 20% SMC during production weeks, but the total amount of water was not always reduced with less frequent irrigation. This was because the containers that were allowed to dry down to 20% SMC were drier compared with 40% SMC. Therefore, they needed more water input at each water event to increase the SMC back to CC.

Considering production and/or post-production quality, allowing SMC to dry down to 20% between watering events during greenhouse production is beneficial as an irrigation method for *Angelonia 'Angelface Blue,' Coleus 'French Quarter,' Heliotrope (Heliotropium) 'Simply Scentsational,' Petunia 'Pink Radiance,' Impatiens 'Sunpatiens Spreading Lavender,'* and *Salvia 'Red Hot Sally II.'* However, considering the crop quality and flower number, we would not recommend this for *I. 'Sunpatiens Compact Coral'* or *Lantana 'Lucky Flame.'*

Terri Starman (tstarman@tamu.edu) is a Professor for the Department of Horticultural Sciences at Texas A&M University.

Cecilia Guo is a Ph.D. graduate student at Texas A&M University. The authors thank the American Floral Endowment for funding this project.