Summer Production of Specialty Cut Flowers in High Tunnels

CONSUMER DEMAND FOR HIGH-QUALITY, LOCALLY PRODUCED CUT FLOWERS IS ON THE RISE. WHAT CAN YOU DO TO SUCCESSFULLY PRODUCE MARKETABLE SPECIALTY CUTS?

By W. Garrett Owen and Roberto G. Lopez

Due to the rise in farmers markets and consumer demand for fresh, high-quality and readily available agricultural products that are locally and sustainably produced, domestic production of specialty cut flowers continues to increase across the country. Those interested in growing specialty cuts are finding the premium prices one can receive for stems and prearranged bouquets, especially off season, are quite lucrative. However, the vast selection of genera and cultivars and lack of production information can pose challenges for beginning growers.

To successfully and profitably produce marketable specialty cuts, growers should consider the species' potential yield, flower quality parameters and potential as a companion flower in bouquets (Figure 1). Quality parameters such as stem length, strength, and architecture can be controlled culturally (i.e., fertility, pruning, netting and growth regulators) and environmentally (i.e. temperature and light). In addition, flower size and number, time to flower from sowing or transplant, and production period (i.e., weeks or season) can ultimately influence the marketability of specialty cut flowers.

Traditionally, highly mechanized greenhouses were used for cut flower production; however, open field and high tunnel production systems are now used for specialty cut flowers. The relatively low cost of growing specialty cut flowers in the field may be appealing, but the risk of extreme weather, seasonal production and limited control can be troublesome. Previous Purdue University floriculture research compared spring and fall high tunnel to field-grown specialty cut flower production of ten species in the Midwest. We found that yield and/or quality increased for antirrhinum 'Rocket Red', dianthus 'Amazon Neon Cherry', matthiola 'Katz Lavender Blue', zinnia 'Benary Giant Scarlet', dahlia 'Karma Thalia Dark Fuchsia', eustoma 'Mariachi Blue', and helianthus 'Sunrich Yellow' and 'Premier Lemon' when produced in high tunnels. To further increase the knowledge base, we investigated another eight specialty cut flower crops. This research was funded by the USDA Specialty

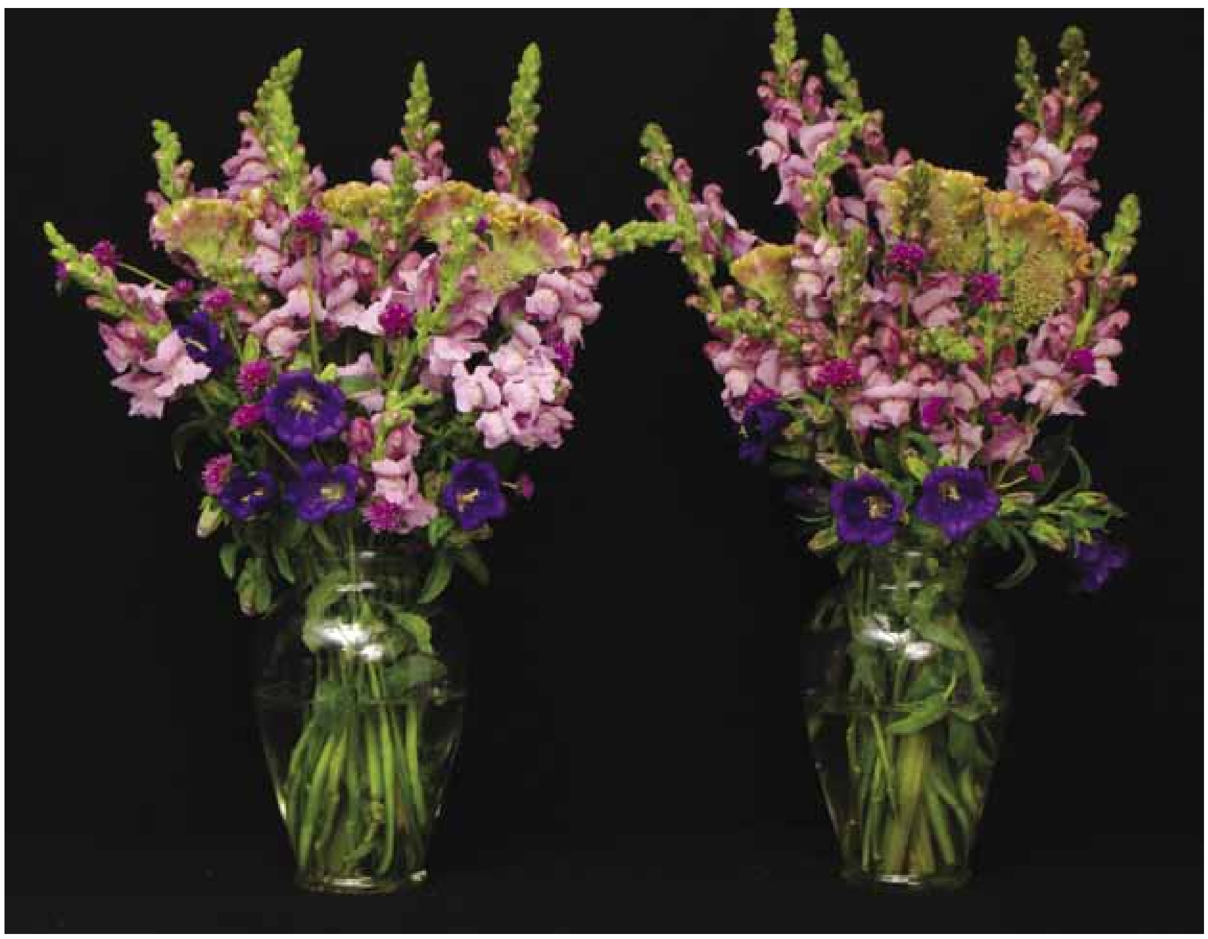

Figure 1. *Example of a mix bouquet of specialty cut flowers grown in a high tunnel (left) or field (right) production system.*

Crop Block Grant program to assist growers in comparing yield, quality and marketability of field and high tunnel specialty cuts grown during the summer months.

How This Study Was Conducted

Selecting Flowers. Cut-flower genera and cultivars were selected from new and established commercially available varieties. Collectively, the selected cuts were popular varieties, boasted a low susceptibility to pest problems, required minimal postharvest handling and had long post-production longevity.

Growing Conditions. Production systems included a single east-west orientated high tunnel and field plots at the Purdue University research farm in Tippecanoe County, Ind., which falls into USDA Zone 5b (Figures 2 and 3). The high tunnel structure was covered with a 6-mm polyethylene film containing copolymer resin with tri-layer construction and UV additives that allowed 92 percent light transmission. Ventilation was provided by manually operated end-wall peak vents and roll-up side walls, though vents and walls were closed during periods of high winds. During periods when air temperature was above 39° F and winds were calm, the high tunnel doors and vents were left open.

Raised beds in the high tunnel and field were filled with compost-supplemented soil and weed barrier fabric was secured down on the beds using landscape anchor pins to reduce weed pressure. Landscape fabric was cut and plugs of the following genera were transplanted: celosia 'Bombay Firosa' (cockscomb) on June 28, 2013; gomphrena 'Fireworks' (bachelor's button) and dianthus 'Amazon Neon Purple' (sweet william) on July 2; antirrhinum 'Potomac Lavender' (snapdragon) and tanacetum 'Snowball Vegmo Extra' (matricaria) on July 9; campanula 'Campana Deep Blue' (bellflower) on July 12; *Eustoma grandiflorum* 'ABC 3 White' (lisianthus) and *Moluccella laevis* (bells of Ireland) on July 25.

Plants were irrigated through drip irrigation as necessary with acidified water supplemented with water-soluble fertilizer that provided 100 ppm nitrogen. On days of measureable rainfall, the cut flowers in the high tunnel received clear water comparable to the rainfall amount. White trellis netting was secured 8 and 18 inches above the beds and used to provide crop support.

Harvesting and Determining Quality, Marketability and Yield. Stems were harvested three days a week when one third of the flowers or florets were open on a single stem. The total number of stems harvested per week and the duration of the harvest period were recorded to determine the crop production cycle and potential succession plantings. The total number of stems were recorded for 55 days for all species with the exception of eustoma, which was harvested for 23 days. Once harvested, stem and flower quality was determined by selecting 10 stems and evaluating stem length, flower diameter, flower number, and stem caliper. Additionally, stems were sorted based on marketability parameters; stems shorter than 30 cm and stems with damaged or disfigured flowers were deemed unmarketable.

Figure 2. Summer production of specialty cut flowers grown in a high tunnel at Purdue University's research farm.

Table 1. Total marketable specialty cut flower stems harvested for 55 days per 40 square feet or raised bed production in a high tunnel or open field.

	Total Marketable Stems	
	High Tunnel	**Field**
Celosia 'Bombay Firosa'	214	216
Gomphrena 'Fireworks'	1,240	1,237
Dianthus 'Amazon Neon Purple'	811	889
Antirrhinum 'Potomac Lavender'	297	194
Tanacetum 'Snowball Vegmo Extra'	406	388
Campanula 'Campana Deep Blue'	194	215
Eustoma 'ABC 3 White'	35	27
Moluccella	510	238

What Made the Cut?

Stem and Flower Quality. Stem length of celosia, eustoma, gomphrena, moluccella and tanacetum were significantly longer when grown in the high tunnel, whereas stem length of dianthus was longer when grown in the field. However, stem length of antirrhinum and campanula were similar in both production environments. Flower diameters of celosia, dianthus and moluccella were greater when grown in the high tunnel. All other species resulted in flowers with similar diameters when grown in both production systems. Flower number was similar among all species when grown in both production systems with the exception of the field-grown eustoma which resulted in more flowers per stem. Similarly, stem caliper was similar among all species regardless of production system with the exception of field-grown campanula which resulted in thicker stems.

Marketability and Total Yield. High tunnel-grown antirrhinum, eustoma, gomphrena, moluccella and tanacetum plants produced the greatest total yield, whereas field-grown celosia, dianthus and campanula resulted in the highest total yield. However, not all harvested stems are marketable as stated above. In Table 1, we can see that the total number of marketable antirrhinum, eustoma, moluccella and tanacetum stems per 40 square feet of raised beds was greatest in high tunnels compared to those in the field production system. However, the most marketable stems of dianthus and campanula were harvested from the field production system. Celosia and gomphrena plants produced similar quantities of marketable stems in both production systems (Table 1).

The results obtained from this study again suggest high tunnels offer several benefits for producing most of the specialty cut flower species tested even in the summer. In some cases, both the high tunnel and field production systems resulted in similar quality parameters. Therefore, growers should determine which production system is best for their farm and market. g

Figure 3. Field production system of specialty cut flowers grown at the Purdue University research farm.

Acknowledgements: We would like to thank Wesley Randall, Joshua Gerovac, Alyssa Hilligoss and Andrea Hilligoss for assistance with data collection. Funding was provided by the Indiana State Department of Agriculture Specialty Crop Block Grant 205749 and the Purdue University College of Agriculture PACE scholarship. Seeds were funded by PanAmerican Seed.

W. Garret Owen (owenw@purdue.edu) is a greenhouse technician and graduate research assistant and Roberto G. Lopez (rglopez@purdue.edu) is an associate professor and floriculture extension specialist at Purdue University in the department of horticulture and landscape architecture.