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Improving production schedules for high-value perennial flowers in Utah: Peony

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Peony (*Paeonia spp.*) production is important to early-season cut flower markets (Kamenetsky and Dole, 2012), and particularly as a high-value crop in local, smaller-scale operations. Peonies are well suited to temperate zones, where winter chilling followed by warming is sufficient for flower development (i.e. at least 70 days of chilling at 2-6˚C) (Halevy *et al*., 2002). Much research to improve production has focused on chilling requirements for warm climates outside of the U.S (Fulton *et al.*, 2001; Halevy *et al*., 2002). In the high-elevation and semi-arid state of Utah, however, growers face long winters that delay the growing season and amplify challenges to meeting early market demands. Therefore, understanding post-chill air and soil warming, as well as the effectiveness of season extenders to advance development, will help Utah growers meet key holiday market demands, such as Mother's Day, and increase farm profitability.

Purpose

- Evaluate high tunnel and outdoor field production of peonies with yield timing and quality.
- Compare low tunnels, low tunnels with soil heating, and unheated controls within the high tunnel and field with yield timing and quality.
- Develop flowering prediction models to schedule flower production that meets a specific marketing window and optimized flower yields in peony.
- Disseminate research findings from peony studies to growers, industry partners, and the wider horticultural community through journal articles, fact sheets, and workshops.

Procedures

The field study is located at the Utah Agricultural Experiment Station - Greenville in North Logan, UT (41' 77" N, -111' 8" W) at an elevation of 4,780 ft. In 2011, 60 peonies (*Paeonia lactiflora* 'Coral Charm') were planted in an outdoor field and 60 peonies were planted in an adjacent high tunnel. We subdivided the field and high tunnel into a total of 18 plots (Figure 1). From these 18 plots, we evaluated six heating treatments in triplicate:

Coral Charm peony just before harvestable "marshmallow" stage.

1) field (F) plus low tunnel (F: +LT -H)
2) field plus low tunnel and soil heating (F: +LT +H)
3) unheated field control (F: -LT -H)
4) high tunnel (HT) plus low tunnel (HT: +LT -H)
5) high tunnel plus low tunnel and soil heating (HT: +LT +H)
6) unheated high tunnel control (HT: -LT -H)

Preliminary Results and Discussion

Temperature Conditions

The 2019 peony harvest is complete within the high tunnel (HT) and in-progress in the field (F). Therefore, the reported preliminary results reflect only the high tunnel treatments. Because of the intensity of field work during this time, data presented are from only April—May 2019.

Overall, the near-surface soil temperature and canopy air temperature fluctuated less and were warmer in the HT versus F. Within the HT, the use of a LT and soil heating helped maintain nighttime temperature lows above freezing. Air temperature

Dr. Stock (center), graduate student Maegen Lewis (right), and undergraduate Trevor Christensen (left) prepare instrumentation during spring break.

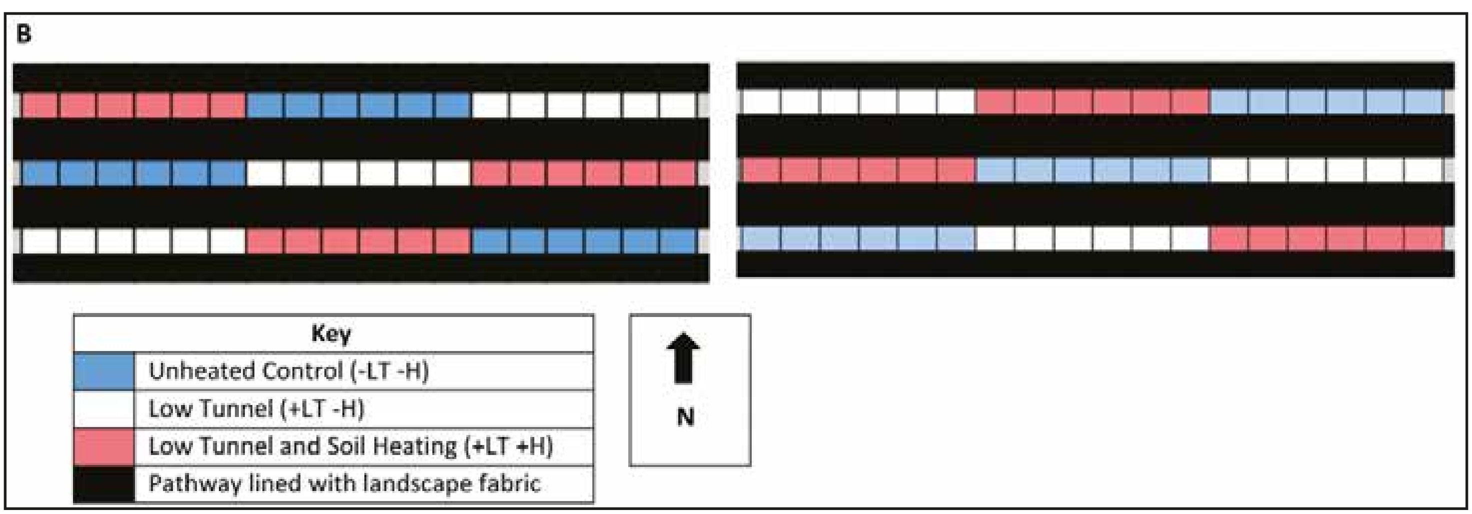
between the field treatments followed a similar pattern to the high tunnel. Soil temperature between the control and unheated LT treatments was more pronounced in the F than in the HT, particularly during the cool April weather.

Yield

The high tunnel advanced peony bloom by nearly one month and made it possible to meet the key Mother's Day market window. The first peony harvest in the high tunnel began on 26 Apr. 2019, and ended on 17 May 2019. Conversely, the first peony harvest in the field began on 20 May 2019 and is near completion as of 10 Jun. 2019. Therefore, only the HT results are reported here.

Within the HT, peak production lasted from 26 Apr.—04 May 2019 with soil heating, 29 Apr.—06 May with only a LT, and from 02—12 May in the HT control (Figure 2). However, the number of culls increased with use of low tunnels and soil heating. We observed that any contact between the plant and low tunnel material resulted in a culled stem. Soil heating advanced plant maturity into late April, a time when LT are generally needed to avoid night-

Figure 1. A) Google Earth view of the Utah Agriculture Experiment Station – Greenville in North Logan, UT. The peony trials in the field and high tunnel are highlighted with a black box. B) Layout of the field (left) and high tunnel (right) plots. Each plot consists of six peony plants. Three heating treatments (unheated control, addition of a low tunnel, and addition of a low tunnel and soil heating) were evaluated in triplicate in both the field and high tunnel, yielding a total of six temperature treatments and 18 plots.



time frosts in northern Utah. Therefore, a new challenge has emerged to create larger low tunnels that still effectively capture heat, while providing sufficient space for the plants. We are excited to trial new LT designs next year to reduce the number of culls, isolate whether the increase in culls resulted from heating effects or low tunnel contact, and begin modeling crop production schedules.

Lastly, we have begun to explore the economic markets in Northern Utah through collaboration with a local flower farmer coop that primarily sells to florists. In 2019, we sold Grade 1 and 2 peonies for $3/stem for purchases of 50 or more, and $5/stem for purchases of <50. All of our peonies sold out at these prices. As we repeat the trials in 2020, we expect to charge $4/stem for 100+ stems, $6/stem for <100 stems, and begin selling culls at a reduced price. Growing peonies is a promising new crop to diversify farms in Northern Utah.

References

Fulton, T.A., Hall, A.J., Catley, J.L. 2001. Chilling requirements of *Paeonia* cultivars. Scientia Hort. 89:237-248.

Halevy, A.H., M. Levi, M. Cohen, and V. Naor. 2002. Evaluation of methods for flowering advancement of herbaceous peonies. HortScience. 37(6): 885–889.

Kamenetsky, R. and Dole, J. 2012. Herbaceous Peony (Peonia): Genetics, Physiology, and Cut Flower Production. Floriculture and Ornamental Biotechnology. 6(1): 62-77.

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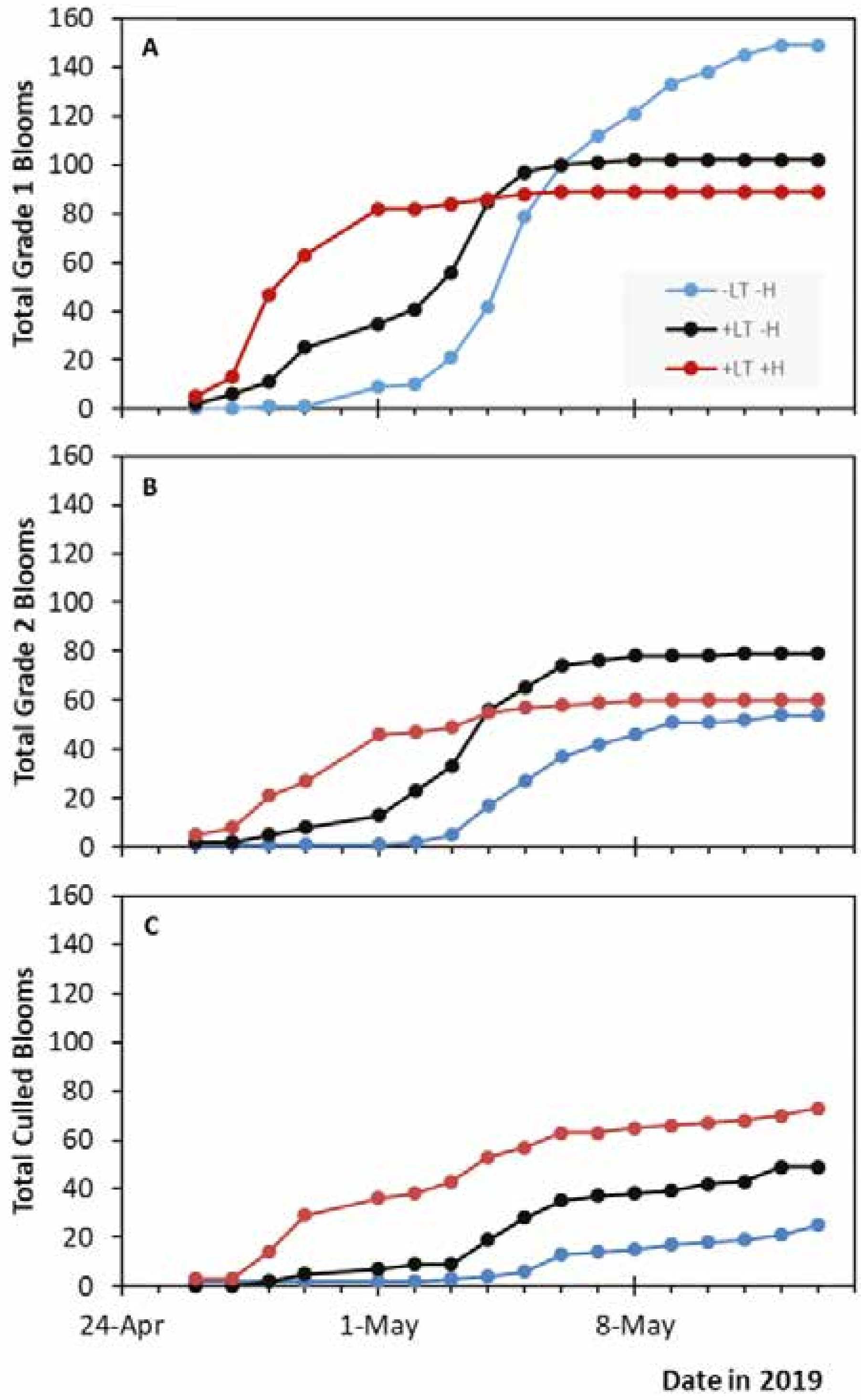

Figure 2. 2019 Peony yields in the high tunnel by heating treatment: the unheated control (-LT -H) in blue, the addition of a low tunnel and no soil heating (+LT -H) in black, and the addition of a low tunnel and soil heating (+LT +H) in red. A) The cumulative number of USDA Grade 1 blooms by date; B) the cumulative number of USDA Grade 2 blooms by date; and C) the cumulative number of culled (unmarketable) blooms by date.

LEFT: High Tunnel peonies on 4/26/2019. RIGHT: Field peonies on 5/21/2019.

Uncovered high tunnel (ABOVE) and field (BELOW) peonies in late May in North Logan, UT.

Can Bacteria Be Beneficial for Cut Flowers?

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A gram of soil can contain billions of microorganisms. Many of these microorganisms are bacteria that live in the rhizosphere, the region of the soil near the plant roots. The bacteria feed on sugars, amino acids, and organic acids in plant root exudates, and the relationship is either beneficial, harmful (e.g. pathogens), or neutral to the plants. Beneficial bacteria can promote plant growth and enhance tolerance to both abiotic and biotic stresses. This is a dynamic relationship that is influenced by many other environmental and biotic factors. In soils where nutrients are limiting, bacteria can increase the availability of macro- and micronutrients and improve uptake efficiency. In the presence of these bacteria, plants can thrive with lower fertilizer inputs.

While the culturable bacteria in the soil are only around 1% of the population, beneficial bacteria available in both commercial products and research collections have been shown to promote plant growth and/or enhance stress tolerance. In the D.C. Kiplinger Floriculture Crop Improvement Program at The Ohio State University, we are investigating the use of beneficial bacteria to improve the production and postproduction quality of greenhouse crops. The objective of this research is to determine if beneficial bacteria applications during production can enhance vase life and flower quality of zinnias grown at reduced fertilizer levels compared to those grown with optimal fertility.

We are testing both commercial biostimulant products, and bacteria from an OSU collection. Growing media is drenched weekly with the bacterial treatments and plants are fertilized with either 1X or 0.5X fertilizer (150 or 75 ppm N) from 15N-2.2P-12.5K-2.9Ca-1.2Mg water soluble fertilizer (Jack's Professional LX, J.R. Peters). Flower vase life and quality are assessed for all treatments. Biostimulants that contain beneficial bacteria provide cut flower growers with a tool to increase flower quality, while reducing fertilizer inputs.

We hypothesize that the improved plant health and stress tolerance we have observed with containerized plants will translate into improved flower quality and vase life for cut flowers.

Use of beneficial bacteria in cut flower production systems to enhance flower longevity when plants are grown at lower fertility levels

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