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Lisianthus Cut Flower Production in Utah

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Lisianthus (*Eustoma russellianum)* is a tender perennial grown as an annual in Utah. Blooming June through October with tall, multi-branching stems, lisianthus is known for its rose-like appearance and long vase life. Lisianthus can be transplanted in the high tunnel six weeks before the last frost date and two weeks before in the field. Stems can reach 30 inches tall and benefit from a horizontal trellis to promote straight growth, especially in windy locations. In North Logan, UT, high tunnels produced an average of 6 to 10 marketable stems per square foot (ft^2), compared to 3 to 5 stems per ft^2 when field-grown.

Lisianthus Groups

Lisianthus are grouped by bloom timing that is a response to light and heat. Group 1 is rated to bloom the earliest under moderate light and heat, Group 2 in summer with high light and heat, while Group 3 blooms later and requires moderate light and heat. Group 4 is less common and grown in warm climates for winter production. Overall, Groups 2 and 3 are highly recommended for high tunnel and field production, 1 has potential for very early high tunnel production, and 4 is not recommended.

Site Preparation

Soil testing is highly recommended and careful use of soil amendments (i.e., fertilizer, compost, manure) is necessary because lisianthus is sensitive to soil salinity, with stress occurring by 1.8 dS per m. Till the soil to incorporate fertilizer or compost based on routine soil test recommendations. Incorporating one inch of low-salt compost into the soil before planting increases organic matter and fertility, with minimal pH or salinity risk. See USU's Compost and Manure Guidelines for options. A soil test is recommended in new planting areas or where soil testing has not occurred in two years. USU's analytical laboratory performs soil tests with pricing available on their website and instructions for sampling here. Rake the tilled soil smooth and form beds that are 3 to 4 feet wide. Wider beds make it difficult to reach the center rows. Install drip irrigation and plastic mulch, if desired, before planting.

For lisianthus grown in high tunnels (Figure 1), planning and preparation begin the previous fall by installing the plastic high tunnel covering before heavy rain or snowfall. This ensures the soil will have the right moisture content for workability early the following spring and decreases the risk of disease.

***Figure 1**. Lisianthus Marichi™ (front), Rosita™ (left) and Doublini™ (right) harvested from a high tunnel.*

Germination

Starting lisianthus from seed must be done indoors, as it takes several months to reach the transplant stage. Pelleted seed is recommended because the seed is very small. Select seed from different series to produce successional harvests in the high tunnel and field (see USU Lisianthus Trials section for information).

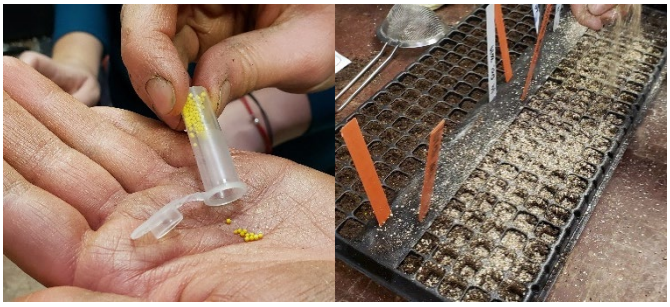

***Figure 2**. Pelleted seed (left) and seeded trays lightly covered in fine, sifted vermiculite (right).*

Sow seeds 12 to 18 weeks before transplanting. For high tunnel plantings, seed by early January for transplanting by mid-April (about six weeks before the last frost date; find your local frost date here). For field plantings, seed by late January for transplanting by early May (about two weeks before the last frost date).

Sow one to two seeds per cell in a 288-cell or 392-cell tray using a high-quality peat/perlite soilless media. Cover lightly with media or fine vermiculite to allow light penetration to the seed, which is essential for germination (Figure 2). Using below-tray watering with capillary mats is recommended to prevent disturbance. Germination occurs within 10 to 15 days at the optimal temperature range of 68 to 71°F. Low light levels, cool temperatures (<65°F), and warm temperatures (>85°F) will lengthen germination time, decrease germination rates, and delay growth. Keep the surface moist, but not saturated, until seedlings emerge. After emergence, reduce moisture levels, maintain consistent temperatures between 60 to 70°F, and increase light. Purchasing pre-grown plugs is another option if equipment, space, and time are limited.

Transplanting

Plants are ready for transplanting when they have four true leaves, at approximately 60 days post-emergence. Transplanting after this stage can result in root-bound plugs, delayed flowering, and reduced stem length. Transplant before temperatures reach 85°F to prevent stress and rosetting. Make sure the stem is completely aboveground and not covered with soil.

Spacing and Pinching

Though industry recommendations for spacing vary from 4 to 8 inches apart, USU trials found that spacing plants 6 inches apart maximized production, while allowing air circulation between the plants and light penetration to the leaves.

Pinching is generally not recommended in the Intermountain West. Pinching results in a greater number of stems per plant (4 to 5 stems with pinching, compared to 1 to 3 stems without pinching), but stem lengths are generally 50% shorter (Figure 3). However, if shorter stems are acceptable in your market and pinching is desired, pinch when there are 8 sets of true leaves (plants will be around 6-8 inches tall).

***Figure 3**. Pinched (left) and unpinched (right) Bolero™ stems.*

Fertilizer

Lisianthus has moderate nutrient requirements. In general, add 0.34 pounds of nitrogen (N) per 100 square feet each year. For example, 0.75 pounds (about 1 cup) of conventional urea fertilizer (46-0-0), or 2.1 pounds (about 6.5 cups) of organic 16-0-0 fertilizer equals 0.34 pounds of N. Use a slow-release source or apply half of the nitrogen at planting and side-dress the other half eight weeks after planting. Phosphorous and potassium should be added before or at planting, but should only be applied based on a soil test, as these nutrients can build up in the soil. USU's Calculating Fertilizer for Small Areas is a useful tool for calculating applications with test results.

Irrigation, Mulch, Pests, and Disease

For high tunnel plantings, a freeze-protected culinary water source may be needed, as most secondary irrigation is not available until later in the spring. Drip irrigation is ideal, as it keeps moisture off the foliage and blossoms, and conserves water. Space drip lines 12 inches apart and cover with plastic mulch. Mulch acts as a weed barrier, helps maintain more even soil temperatures, and reduces soil water loss (Figure 4). Generally, black plastic mulch is recommended for early spring plantings to warm soil, while white plastic is used with later plantings to maintain cooler soil.

For optimal growth, lisianthus needs moist soil that is allowed to dry in between watering. Apply 0.5 to 2 inches of water per week (¼ to 1 gallon of water per square foot), depending on temperature, growth stage, and soil texture. Very early spring plantings initially require less water, depending on soil moisture at planting and subsequent growth rate, while more water is needed in summer when temperatures are warm, and plants are tall and blooming. See Tables 1 and 2 for common production challenges from pests and disease.

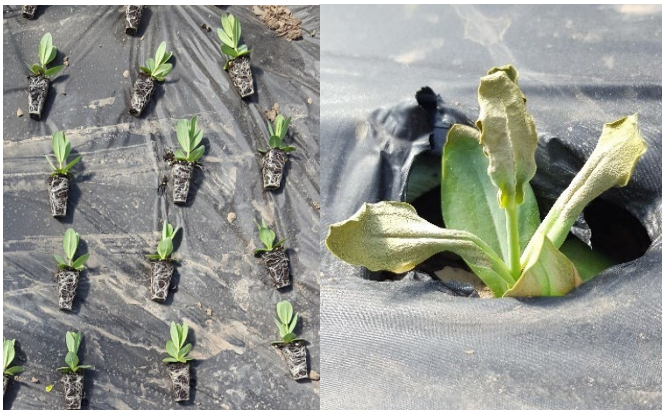

Figure 4*. Transplanting plugs (left) and leaves burned from improper temperature management in plastic mulch (right).*

Trellising

A horizontal trellis helps promote straight, marketable stems. Lisianthus is highly gravitropic, meaning stems will curve upwards if they begin to bend, and are also susceptible to breakage. Mesh trellis (6 x 6 inches) pulled taut across the bed is most effective (Figure 5). Trellis is easiest to install before planting and can also serve as a planting grid. Trellis installation after planting when plants are tall can damage stems. Two methods for staking the trellis can be implemented. If shade or low tunnels are used, the hoops can support the trellis across the row. See USU's Low Tunnels for Field Cut Flower Production fact sheet for more information.

Alternatively, install wooden stakes or tall rebar at 3- to 5-foot intervals along the bed edge (Figure 5). The trellis should be moved upwards as the plants grow to match half the height of the tallest stems. Two tiers of horizontal trellis may be needed.

Figure 5*. Spacing plants 6" x 6" in plastic mulch and using a horizontal trellis encourages production of straight stems.*

Shade

Shade is recommended after the high tunnel plastic and/or row covers have been removed. During summer production, shade is used to cool the environment, encourage stems to grow longer, and reduce the incidence of flower scorch. Shade should cover an entire high tunnel or a single row in the field. Reference USU's Low Tunnels for Field Cut Flower Production fact sheet for tips on shading small growing areas.

Harvest and Storage

Depending on high tunnel or field temperatures and lisianthus variety, flowering begins 8 to 10 weeks after transplanting. Harvest during the cool parts of the day when two or more of the florets on each stem are open: the bottom florets will be fully open, while the middle florets can be half (Figure 2). Florist-grade stems are a minimum of 12 inches long with a preferred length of 16-30 inches. Place the cut stems directly into water while harvesting to avoid wilting. After harvest, strip leaves from the bottom half of the stem, trim cut ends, and place in fresh water with floral preservative. Move the cut stems into cool storage (40°F) and store upright to prevent stem curvature. Cool storage is effective for 4 days, and quality decreases with longer storage. Vase life is at least 14 days with fresh stem cuts, the use of floral preservatives, and frequent water changes.

Economics

Lisianthus is a florist staple and is consistently in demand due to its long vase life and beautiful blooms. Because wholesale imports are easily damaged during transport and storage, lisianthus is especially suited as a

specialty crop option for local farms. High-quality, locally grown lisianthus that is longer than 12 inches and a popular color is in strong demand. In 2019-20, USU-grown lisianthus sold in bunches of 10 for $15.00 to $18.00 ($1.50 to $1.80 per stem) in Cache Valley and Wasatch Front markets. In 2021 and 2022, the wholesale import price ranged $1.85 to $2.50 per stem (USDA-AMS, 2022).

***Table 1**. Common diseases of lisianthus.*

Disease	Identification	Control
Botrytis (gray mold)	A fungal disease that appears as brown dead areas and may have a gray fuzzy appearance. Affected areas are buds, flowers, leaves, and stems.	Adequately space and vent plants and surroundings. Prune and destroy infected plant material. Regularly disinfect pruners to prevent spread. Spray with fungicide effective against botrytis blights, such as potassium bicarbonate.
Downy Mildew	Light yellow or green patches on leaves that will develop spores under humid conditions. Plants may eventually die.	Remove any diseased debris; use drip instead of overhead irrigation to reduce moisture on the leaves. Fungicides can be applied as a preventative treatment.
Impatiens necrotic spot virus (INSV)	Viral disease with many symptoms including stunted plants, yellowing of leaves, and necrotic spots on leaves. Spread by thrips.	Controlling thrips is vital in reducing spread of INSV. Keep plants suspected of virus isolated from healthy plants, and dispose of any plants that are confirmed to carry INSV.
Powdery Mildew	A fungal disease that produces a white or light gray powder on leaves, stems, and occasionally flowers.	Keep the area weeded and debris free. Control early-season infestations with copper fungicide. For late season, chemical control may not be warranted. Remove and destroy plants after fall freeze.
Root, stem, and crown rots	Fungi that infect roots and crowns, producing dull-colored foliage or wilting followed by yellowing. Roots are dark, soft, or decayed. Plants may be stunted and eventually die.	Plugs should be transplanted with well-developed roots that are not root-bound. Plant in well-drained soil and avoid excessive irrigation/moisture. Dig out and destroy infected plants.

***Table 2**. Insect pests of lisianthus.*

Insect	Identification	Control
Aphids	Green, yellow, or black soft-bodied, sap-sucking insect. Populations can build up rapidly. Sticky honeydew from the aphids can accumulate on leaves and stems.	Encourage natural predators by avoiding broad-spectrum insecticides. Ladybeetles released inside a high tunnel can be effective, but will leave the area over time. Applying insecticidal soaps and oils is often the best choice.
Leaf Cutter Bees	Small, 1/5 to 1-in bees with dark bodies and light stripes on abdomens. Adults cut circle-shapes in petals for nesting material, which damages bloom and degrades quality.	Physical barriers, such as row covers, are effective in excluding leaf cutter bees and preventing damage to flowers. Leaf cutter bees are an important pollinator and chemical management is not recommended.
Leaf miners	Masses of eggs laid on plants will hatch into small, white/yellowish maggots that tunnel into leaves. The winding tunnels look white to necrotic. The lifecycle repeats at least three times per year without management.	Avoid irrigation stress. Check young transplants often, crush eggs, and remove infested leaves. Some wasps are natural predators. Spinosad is effective when applied to plants as eggs hatch. It cannot kill larvae feeding inside the leaves. In fall, remove crop residue and till the soil.
Mice/Voles	Chew stems at base; can fully kill plants.	Control rodents with rodenticide bait or traps under the low tunnels and within the high tunnels.
two spotted Spider Mites	Very small, feed primarily on the underside of leaves, and cause stippling (light dots) on the leaves that can turn bronze then brown and fall off. Sometimes confused for leaf burn. Form thin webbing that covers leaves.	Avoid irrigation stress. Minimize conditions in and around planting that cause dust to collect on plants (i.e., bare soil). Control surrounding weeds. Avoid or limit broad-spectrum insecticide, as mite outbreaks often follow. Spray plants with water, insecticidal oil, or soap.
Western flower Thrips	Very small with fringed wings. Transmits viruses and hides in florets, making blooms undesirable.	Chemical control is difficult; Malathion only protects for 2 days and will kill beneficial insects. Keep weeds (often host plants) clear of the area.

USU Lisianthus Trials

Greenville Farm Trials, 2018–2020

We trialed seven series across Groups 1 to 3 with transplanting dates from March to April in high tunnels and April to May in the field at the Greenville Research Farm, North Logan, UT (USDA Hardiness Zone 5, last frost date: May 15). Plants were grown from seed in a greenhouse and transplanted at a 6-inch spacing. We evaluated harvest timing, yield, and bloom quality.

Series Evaluations

We trialed Bolero™, Corelli™, Doublini™, Mariachi™, Roseanne 1™, Roseanne 2™, Rosita 2™, Rosita 3™, and Voyage 2™. Table 3 displays a summary of each series. Groups 2 and 3 performed best, as they tolerated the summer heat and sun better than Group 1. Group number did not coincide with bloom timing.

Bolero™, Correli™, Roseanne™, and Rosita™ performed well and are highly rated for production in Northern Utah. Bolero™ produced the greatest yields and tolerated warmer temperatures, which extended harvest in high tunnels and improved field production. Mariachi™ had more moderate production. Blooms had fewer petals that opened wide, creating a unique look but also increased likelihood of damage. Doublini™ had a limited color range and produced very few, small flowers, making it the least desirable in the trial.

High Tunnel and Field Transplant Dates

We maximized growth during cool, spring conditions by transplanting six weeks before last frost in high tunnels and two weeks before in the field, using frost blankets on nights colder than 30°F. Planting any earlier lowered yield. Because bloom is a response to daylength (>14 hours hastens bloom), peak production coincided across our high tunnels and field, from mid-July to late-August.

Lisianthus excelled in high tunnels, allowing for earlier transplants in cool weather and protection from hard freezes, snow, wind, and intense sunlight. Early April transplants (i.e., six weeks before last frost) avoided both stunting from cold stress and rosetting from heat. This resulted in the greatest yields, 78% marketability of stems, and an extended harvest from mid-July through mid-August for all series, compared to March transplants. Total yield (*in stems per ft²*) ranged from 11 for Bolero™ to 5 to 8 for Corelli™, Roseanne™, Voyage™, Mariachi™, Rosita 2™, and Rosita 3™. The quality of field-grown stems was low; only 58% were marketable. Spring frosts aborted buds, while wind and early summer heat (>85°F) resulted in shorter stems, and there were some challenges with even irrigation. Transplanting two weeks before last frost and using shade improved production. Corelli™ and Rosita™ were most tolerant of the cold. Total yield (*in stems per ft²*) was 7 for Bolero™ to 4 to 5 for Corelli™, Mariachi™, Roseanne™, Rosita 2™, Rosita 3™, and Voyage™.

Kaysville Trials, 2021–2022

We trialed two series at the USU Botanical Center, Kaysville, UT (Zone 6, average last frost date: May 10). Plants were sourced as 1-inch plugs in early April, potted into 2-inch plug trays, and grown in a greenhouse until transplanting in a field at an 8-inch spacing in mid-May. In 2021, harvest of Super Magic 2™ began on June 29 and peaked on July 25. Yield averaged 4.9 marketable stems per ft² (2.7 stems per plant). In 2022, harvest of Corelli 3™ began on July 26 and peaked August 15. Yield averaged 5.5 marketable stems per ft² (3.0 stems per plant). Of harvested stems, 84% were marketable and stem lengths averaged 19.6 inches.

Conclusions

Lisianthus is a florist staple and excellent crop for local farms. Its limited cool-storage period, long vase-life, and broad range of pastel- to jewel-tone colors are superior to wholesale imports. Transplanting in cool conditions and moderating temperatures are critical for high-quality stems and maximizing yield. Transplant six weeks before the last frost date in high tunnels and two weeks before in fields to optimize and extend harvest.

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***Table 3**. Lisianthus series (group number) with descriptions from USU trials in North Logan and Kaysville, Utah.*

Series Descriptions		
 **Bolero™ (2-3)** Flared, open, 2-3" blooms. Uniform bloom time of plants and individual stems. Stems often shorter, but greater yields than all other series. Also tolerated warm temperatures. *Colors*: blue blush, blue picotee, green, white.	 **Corelli™ (2-3)** Frilled, 2-3" blooms bunched near the top of stems made them easy to harvest and well-suited for arrangements. Also tolerated cooler temperatures. *Colors*: apricot, blue, lavender, peach, pink, white, yellow.	 **Doublini™ (1)** Tight, double, 1-2" blooms were the smallest and least desirable of the trial. Few flowers per stem. Blooming at different times, full stems were difficult to harvest. *Colors*: blue, rose pink, white.
 **Mariachi™ (2)** Unique, flared, thick, and very open petals on large, 2-3" blooms compactly arranged on stems. Blooms had fewer petals and were susceptible to damage. *Colors*: blue, carmine, green, lime green, lavender, pink, pink picotee, white, yellow.	 **Roseanne™ (1-3)** Cupped, ruffly, 1-3" blooms in unique colors. Long stems with multiple side stems for additional harvest. Long internodes made them difficult to use in arrangements. *Colors*: black pearl, brown, green.	 **Rosita™ (2-3)** Large, rose-shaped, 1.5-2" blooms bunched near the top of stems made them easy to harvest and well-suited for arrangements. Tolerated cool temperatures. *Colors*: apricot, blue-green, lavender, pink, red, purple, yellow, white.
 **Supermagic™ (1-2)** Large, 2-3" double-flowered blooms concentrated near the top of the stem. Color graduates to lighter shades in the center of the bloom. *Colors*: apricot, blue, blue picotee, champagne, green, lavender, pink, white, yellow.	 **Voyage™ (2-3)** Very ruffled, 3" blooms in pale tones. Flowers bunched near the top of the tall stems made them easy to harvest and well-suited for arrangements. *Colors*: blue, champagne, deep rose, green, lavender, apricot, pink, white, and yellow. *Image courtesy of Three Sprouts Flower Farm.*	

Disclaimers and Acknowledgements

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