

Cultural Information for:	Lisianthus Cut Flower (Pot)	Annual
Common Name:	Texas Bluebell	
Botanical Name:	Eustoma grandiflorum F1	
Seed Count:	23,000 /ounce	800 /gram
Optimum Germination Temperature:	68-70°F / 20-21°C	
Optimum Growing Temperature:	65-70°F / 18-21°C	

Plug Culture – 8 weeks (288 / 12 x 24 tray)

Pre-Cooling (21days) Sow pelleted seed into a 288-cell tray and do not cover the seed. Water the tray well and then place it in a dark cooler at 50°F/10°C for 3 weeks to increase germination rate and promote a more uniform emergence. Afterwards, follow the instructions in Stage One.

Stage One (days 1-14) If pre-cooling is not an option, sow pelleted seed uncovered into a 288-cell trays and never allow it to dry out during germination. Enough moisture must be provided to melt the pellet. Maintain a soil temperature of 70°F/ 21°C. Optimum pH is 6.5 (artificial media) to provide enough calcium levels. Placing the seed flats on capillary mats or plastic helps to keep the media moist and encourages a very uniform emergence. **Note:** 100 to 300-foot candles/1,000-3,000 lux of light is needed for germination.

Stage Two - (days 14 - 21) After the seedlings emerge, remove the seedling flats from the germination area and place them in a location with good air circulation. Lower the night temperature to 60-65°F/16-18°C and provide a light feed between 70 - 100 ppm of Nitrogen from a well-balanced calcium nitrate-based fertilizer. Be careful not to allow the day temperature to exceed 77°F/25°C or the night temperature to drop below 54°F/12°C to avoid rosette problems, (induced resting stage), which is difficult to cure.

Stage Three - (days 21 - 56) The young seedlings are very slow in growth and require extra care to avoid high or low temperatures to prevent rosette*. Other factors to avoid are low light levels and excessive humidity, which will invite both disease and overgrowth of the seedlings. Since Lisianthus is native to the alkaline soils of West Texas, Arizona, and Southern Colorado, calcium-based feeds help to maintain stronger and healthier seedlings. Fertilize the seedlings with 200 ppm of N or as needed and maintain the media EC levels between 0.7 to 1.0 mmhos (1:2 slurry).

Stage Four - (day 57 - 60) The seedlings should have 4 true pair leaves at this stage and are now ready to transplant into pots. Lisianthus has a sensitive root system and one must be careful to avoid checking the plugs. Timely transplanting will ensure that the root system stays active and takes hold in the final container. Older plugs with more than one internode take longer to establish with less than optimal performance.

*To avoid rosette in warm areas, keep cool temperatures at night 55-59°F/13-15°C and days between 75-80°F/25-27°C until transplant. The key point is to grow cool at night for 12 hours. This *cool system* helps prevent rosette under warmer non-optimum temperature conditions.

Transplant to flowering (90 – 120 days)

Transplanting: Transplant the seedlings when they are young and actively growing, (around 2 pairs of true leaves). To avoid stem rot, take care not to bury the plants too deep. Set the plugs a little “high” in the container to guard against rhizoctonia. To ensure a healthy start, maintain high relative humidity for 10 days after transplanting and do not let the soil dry out. Target the media pH at 6.5-6.8 for best results. A pH lower than 6.5 increases the risk of micronutrient toxicity and uneven growth.

Plants per Pot: In general, place 2 plugs per 5 inch/12 cm. pot and 3 plugs per 6 inch/15 cm. pot. Overcrowding of plants can promote disease; especially botrytis.

Temperature: Maintain a temperature of 60-65°F/16-18°C at night and 68-77°F/20-25°C during the day.

Irrigation: Since Lisianthus is native to low humidity areas, botrytis is a major disease problem. The use of drip irrigation is best to reduce free moisture on the plants. Watering early in the morning allows enough drying; especially if watering overhead.

Fertilization: Lisianthus does well with high rates of fertilizer as long as the pH is 6.5. Maintain a soil EC level around 0.8 to 1.2 mhos, (1:2 slurry). The use of Calcium Nitrate based fertilizers is recommended to build strong stems and reduce soft growth. Lisianthus requires higher moisture levels in the early stage of development. As the plants begin to mature and show flower buds, watering should be reduced to tone the plants.

Methodology	Recommendation
Controlled release fertilizers 14-14-14 or 19-6-12	8 to 10 lbs. / cubic yard 2.75 to 3.5 kg. / cubic meter
Constant Liquid Feed (CLF) 15-5-15, 20-10-20, 17-5-17	150 -200 ppm Nitrogen N:K ratio 1:1.5
Slow release and CLF combination	5 lbs./cubic yard – 1.75 kg./cubic meter, plus 250 ppm Nitrogen (constant liquid fertilizer).

Flowering: Lisianthus development is influenced by temperature, light intensity and photoperiod. Media temperature has the greatest influence followed by light intensity and photoperiod. Being a facultative long day plant, Lisianthus develops flowers quicker when the days are greater than 14 hours. Higher light levels and warmer temperatures will also accelerate flowering response. The use of mum lighting at the 6th true leaf stage, from 10 PM to 2 AM, during the short days of winter will reduce the flowering time. Be sure to maintain at least 55°F/13°C soil temperature.

Insects: Fungus gnats (plug stage), leaf miner and thrips

Disease: Botrytis, fusarium, pythium and rhizoctonia

Variety Selection: Similar to forcing Snapdragons (Antirrhinum)

Lisianthus cut flower varieties are grouped according to their response to temperature, light quality/intensity and photoperiod. Winter and spring flowering groups (Group 0 and 1 respectively) produce less numbers of nodes prior to flowering so they require less aggressive height control and ideal for spring sales. Group 2 varieties are ideal for late spring and summer sales. Below is a general guide.

Group 0 (9-10 nodes)

Winter Borealis (standard double flower)
 May-September*

Group 1 (12 nodes)

Spring Piccolo 1 (spray single flower)
 September-December* Doublini (spray double flower)
 Rosita® 1 (spray double flower)
 Wonderous (standard single flower)
 Echo (standard double flower)

Group 2 (15 nodes)

Mid-Summer Mariachi® (quadruple flower)
 December-February*

***Southern Hemisphere flowering periods**

Mechanical Height Control: To control plant height without using chemicals, apply a soft pinch 5-6 weeks after transplanting when the plants are established in the pot and the plants begin to bolt. Target the pinch in order to leave

6-7 true pairs of leaves. Then, again pinch the side shoots before flower buds appear to leave 3-4 true pairs of leaves. Pinched plants require a longer crop time than non-pinched plants.

Grower Tip: Studies show that seed sown under short days and flowered under long days enhances basal branching.

Chemical Growth Regulation: Chemical growth retardant applications are necessary when tall cultivars are used for potted plant production. B-Nine® (daminozide), Bonzi® (paclobutrazol) and A-Rest® (ancymidol) are effective. The time of year, series being used and specific cultivar within the series will determine which chemical is selected and how many applications are required. Below is a guide. Additional applications may be necessary.

B-Nine / Alar	PPM Spray	When to apply
1 st treatment	3,200 – 4,000 0.32 - 0.4%	1 week after transplanting
2 nd treatment	3,200 – 4,000 0.32 - 0.4%	3 weeks after 1 st treatment (2 weeks in summer)
3 rd treatment	3,200 – 4,000 0.32 - 0.4%	3 weeks after 2 nd treatment (2 weeks in summer)

A-Rest	PPM Drench	When to apply
1 st treatment	10 ppm 30 ml. per 4 in./10 cm. 50 ml. per 6 in./15 cm.	When the shoots on the pinched or non-pinched plant are 2 in./5 cm. long.
2 nd treatment	10 ppm 30 ml. per 4 in./10 cm. 50 ml. per 6 in./15 cm.	10 – 20 days following the first treatment.
3 rd treatment*	5 ppm 30 ml. per 4 in./10 cm. 50 ml. per 6 in./15 cm.	If needed apply at time of visible bud.

*Blue cultivars usually need 2 treatments and white flowered cultivars 3 treatments.

Bonzi	PPM Drench	When to apply
1 st treatment	10 ppm 30 ml. per 4 in./10 cm. 50 ml. per 6 in./15 cm.	When the shoots on the pinched or non-pinched plant are 2 in./5 cm. long.
2 nd treatment	10 ppm 30 ml. per 4 in./10 cm. 50 ml. per 6 in./15 cm.	10 – 20 days following the first treatment.
3 rd treatment		Not recommended.

Note: Blue cultivars treated with chemical growth retardants flower about a week earlier than non-treated plants. This flowering acceleration, however, is not observed in white and pink flower cultivars.

Crop Schedule (from transplant)

Plug Size	Spring	Summer	Fall	Winter
288	14-15	11-12	13-14	16
128	13-14	10-11	12-13	15

Culture Watch Points: Ultraviolet light intensifies flower color. High night temperature (>73 °F/23 °C), excess fertilizer/nitrogen, or keeping the media too moist will reduce intensity. Strong light intensity (>5,000-foot candles./ 54,000 lux) combined with warm temperatures will cause flower scorch.

Note: Please note that the above information is given as a suggestion only. Many factors, including temperature, light quality, latitude and photoperiod, greatly impact crop time and height. Growers should first do trials before committing to large scale productions.

“All information given is intended for general guidance only and may have to be adjusted to meet individual needs. Cultural details are based on North American conditions and Sakata cannot be held responsible for any crop damage related to the information given herein. Application of recommended growth regulators and chemicals are subject to local and state regulations. Always follow manufacturer's label instructions. Testing a few plants prior to treating the entire crop is best.”