The Growing of Lisianthus Under South African Conditions©

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INTRODUCTION

***Eustoma grandiflora*: lisianthus, prairie gentian, Texas blue bell.**

- *Eustoma*: Gentianacea family.
- *Eustoma grandiflora* (syn. *E. russellianum*) is the first name given to this species of the *Eustoma* genus. On the basis of international nomenclature rules the name *Lisianthus*, is a synonym for *Eustoma*.

Lisianthus is native from Colorado to Texas, U.S.A., where these plants grow in the prairies. If the seeds in nature germinate early in the spring they will flower the same season. If germination takes place later in the season, with higher temperatures, drought, etc., the plants will not flower until the next year.

With commercial selections, we find the same characteristics with seedlings "rosetting" when exposed to high temperatures. Breeders are currently breeding for selections that are tolerant of these conditions. Lisianthus is a quantitative long day plant, i.e., plants will flower quicker with less leaf pairs and shorter stems under long day situations. There are, however, new selections which are less susceptible to long day periods and heat and there are now excellent cultivars for summer and winter production.

MINIMUM GROWING CONDITIONS FOR LISIANTHUS

- Lisianthus is usually grown under cover for easier control of temperature and humidity levels. Some producers grow lisianthus under shade nets but unfavourable wet conditions may cause fungi problems.
- Optimum temperatures for lisianthus are: minimum 15 to maximum 25 °C during the growing period. Lower night temperatures, e.g., 5 °C for a number of nights will not influence flower quality but will lengthen the production time.
- It is difficult during our summers to maintain the 25 °C. A temperature of 35 °C has proven acceptable. Under these hot conditions it is essential to provide extra shade with shade net or white washing of the plastic roof.
- As far as irrigation is concerned, it is recommended to use overhead micro-irrigation and later when the plants come into bud to switch over to drip irrigation.

PRODUCTION CONDITIONS

Soil Conditions. It is essential to have the soil, which is going to be used for lisianthus (or any other cut flower selection) tested by an accredited soil analyses laboratory. At the same time ask the laboratory for the recommendations to rectify shortages or excesses. This will give a grower good guidelines to plan a fertilizer program in order to obtain the best results. In this way there will also be a savings in the use of fertilizers.

Soil Preparation. The soil structure is also very important. Lisianthus prefers a deep and very well drained soil. Lisianthus roots can go as deep as 50 to 60 cm. Soil with a loose structure will make planting out easier and provides better soil contact with the roots of the seedlings. The soil must be deep and evenly cultivated; this will ensure an even water distribution. Even soil moisture is very important — lisianthus does not like uneven soil moisture levels. A heavy clay soil tends to give more problems with soil fungi. When planting it is recommended that raised beds be used on all soil types. Raised beds provides better drainage as well as ventilation (air movement) around the plants.

Support Netting. Usually it is enough to support lisianthus with a single layer of support netting. It is recommended to use a 64-maze net which is also used in chrysanthemum culture.

Lisianthus, which are planted for single-stem culture, i.e., one stem per plant, should be planted at a rate of 64 plants per m^2. Plants that are "topped" (the growth tip being pinched out) should be planted at 48 plants per m^2.

Topping or Pinching of Plants. Pinching is done once the seedlings are well established, which is about 2 to 3 weeks after planting into the beds. The purpose of pinching is to produce up to three stems per plant during the first flush. Pinching lengthens the production time by about 3 weeks.

Plants that are not pinched will produce in the first flush a better quality stem.

Planting Times. Growers with heated greenhouses can plant lisianthus throughout the year. Growers with unheated houses, depending on climatic conditions and where night temperatures do not go below 5 °C, will also be able to produce a reasonable crop during the winter months. In colder areas planting in spring or early summer for flower production during summer and autumn is recommended. The choice of cultivars influences success or failure. There are different cultivars for winter and summer production. Consult with your seedling supplier.

When Planting Lisianthus Seedlings Consider the Following. Firstly ensure that the trays of seedlings (plugs) are well-watered before planting. For optimum results plant lisianthus in a well-watered and warm soil. The best soil temperature to plant in is 18 to 25 °C. It is essential that the seedlings' roots do not dry out after planting. If the top 10–15 cm of the soil becomes too dry during the first 2 to 3 weeks, quicker formation of flowers will take place resulting in thin and weak stems. Too dry conditions can also result in rosetting of the plants. Make sure that the top 10–15 cm of soil is kept wet especially the first 3 weeks after planting but that the bottom part of the soil does not become too wet.

In order to prevent transplanting stress during hot sunny conditions, it is recommended to provide shading for the first few weeks. This can be done with 40% shade netting.

Growing Conditions. The growing conditions which have to be maintained differ from area to area as well as the type of structures in which they are planted. The choice of cultivars is also playing a major role.

The growing of lisianthus can be divided into three distinct stages*:

Stage 1. Weeks 1 to 3: Enough water in the top 10–15 cm and optimum soil temperature. Additional shading if possible.

*The Stages as pointed out may differ slightly from grower to grower, depending on climatic and growing conditions.

Stage 2. Weeks 3 to 8: Period of vegetative growth. Forming of strong root systems and strong plants. Deeper waterings with longer intervals. Increase fertilizer concentrations.

Stage 3. Weeks 9 to 10: Generative growth. Forming of stems and flower buds. Change from nitrate to sulphate fertilizer. Increase calcium applications.

Stage 4. Weeks 12 to 16: The flowering and cropping period. Keep plants well-watered.

It is very important to get rid of excess humidity in the greenhouses, early in the morning during the colder winter months. This must be done by opening up the greenhouse, letting moist air out and dry air in, even if this will reduce the temperature for a short while. Rather a lower temperature than too much moisture and condensation drip.

Slower growing (summer) cultivars will benefit from the high summer temperatures.

In the winter, these slow growing cultivars flower very late or not at all.

Optimal temperatures for lisianthus is 15 °C night and 25 °C day. As mentioned before a grower should try to come as close to the optimums as possible. Excellent ventilation, at all times, is very essential while growing lisianthus.

Watering of Plants. For uniform growth the even and regular application of water is very important. The best way to irrigate in the beginning is by overhead micro-mist irrigation. This will keep the small plants clean and cool. The moment the plants start budding it is recommended to change over to watering with drippers.

The quantity and the regularity of watering depends on the soil structure as well as climatic conditions. It is essential to monitor the moisture content of the soil at root level on a regular basis — the correct soil moisture will determine success or failure. Good watering methods will ensure strong root systems and good growth.

Too much water on the other hand can cause root diseases and plants dying off.

Good drainage is so important — excess water must be able to drain off.

Stage 1. It is very important that the seedlings which have not yet " rooted through" (growing of roots out of the root ball into the soil) must be kept wet.

Stage 2. Once rooting has started, the soil moisture can be reduced to normal.

Stage 3. When the plants are well rooted and settle, the watering intervals must be reduced sothat the plant will be forced to search for water deeper into the soil.

Stage 4. Make sure that there is enough moisture in the soil when flowers are picked. This will increase the vase life of the flowers. It is best to give water early in the morning. An indication of the quantity of water required per watering, is between 7 to 10 $L \cdot m^{-2}$ (depends on soil type and climatic conditions and must be monitored).

Fertilization. Lisianthus prefer regular and good feeding. One can classify them as fairly hungry plants. It is essential that prior to planting the soil is analyzed and on that basis it is determined how and what to fertilize with or which elements have to be leached out of the soil.

From the start, lisianthus requires an EC of 0.9 $mS \cdot cm^{-1}$ in the soil with phosphate between 0.15 and 0.2 $mmol \cdot L^{-1}$ (phosphate stimulates root formation). The optimum potassium/nitrate combination should be a ration of 1 : 2. Calcium value must be a minimum of 0.5 $mmol \cdot L^{-1}$ above the sulphate value.

Fertilization starts 7 to 10 days after planting; this is if the soil had the necessary elements before planting. On sandy soils feeding should start immediately.

From the start the EC of the water plus fetilizer should be 1.5 $mS \cdot cm^{-1}$. Once the plants are well established this will be increased to 2.0 to 2.5 $mS \cdot cm^{-1}$, especially on sandy soils. With applications above EC 1.7 it is advisable to rinse the soil with a little clean water to protect the small roots of small plants.

In the beginning and growing-on stages one applies nitrate fertilizers. In the bud stage change from nitrate to potassium feeding. Also in the bud forming stage the calcium content must be a minimum of 2.5 $mmol \cdot L^{-1}$. This is to prevent bud burn and misformed top flower stems. A regular foliar feeding with calcium metalosate insures sufficient calcium for the plant.

The optimum values for fertlizer content in the soil for lisianthus are:

- pH 6.00 and EC 0.9.
- Main elements: NH4 – 0.1; K – 1.7; Ca – 1.9 – 2.5; Mg – 1.0; NO_3; Na 0.5; Cl – 0.5; SO_4 – 1.4; P – 0.20; and Si – 0.25.
- Plus micro elements.

PESTS AND DISEASES

Aphids, leaf miners, thrips, whiteflies, and spider mites can be a problem with lisianthus. *Botrytis, Fusarium, Pythium, Rhizoctonia,* and downy mildew can be severe problems. Downy mildew, caused by *Peronospora chlorea* is a unique fungus only found on plants of the gentian family; it is not the same fungus that cause downy mildew in roses and other plants. *Peronospora chlorea* originated in Holland. Its host is a plant of the gentian family that grows on the dunes near the sea. Downy fungi found in other plants represent no threat to lisianthus. Downy mildew spores can be active for a long period in a greenhouse where lisianthus is regularly grown. Ideal conditions for a downy mildew attack are high humidity and large temperature fluctuations. Control of *P. chlorea* is not easy. Climate control is not sufficient and a strict spraying program has to be followed. At the first sign of infestation spray with a systemic fungicide. Thereafter spray preventative with a suitable contact fungicide; alternating with systemic and contact fungicide sprays. Also control fungi by maintaining optimum growing conditions.

POSTHARVEST

Flowers are ready for harvest after the terminal bud is open and at least one or two laterals are flowering. If harvested too early, colour development in the darker colours is poor and the flowers will not reach their potential size. For the local market harvest can be delayed and up to 5 or 6 flowers can be open. Usually it takes 2 to 3 weeks to harvest. Do not cut the stems too close to the base; leave two to three internodes on the plant, if you want to re-grow a second flush from the same plants.

The second flush will come into flower 8 to 10 weeks after cut-back. Try and grow not more than two to three stems per plant on the second flush; this will improve the stem thickness and length. Usually the second flush does not produce the same quality as the first flush but it is still worthwhile growing.