

# Lilium Cut Flower Production Under Polyhouse

Sonu Kumar<sup>1\*</sup> and Narender Kumar<sup>2</sup>

<sup>1</sup>Department of Horticulture, CCS Haryana Agricultural University, Hisar

<sup>2</sup>Department of Agriculture, Dolphin (PG) Institute of Biomedical & Natural Sciences, Dehradun

Corresponding Author - [chaudharysonucs@gmail.com](mailto:chaudharysonucs@gmail.com)

## Introduction

*Lilium* one of the most important bulbous flowers, belongs to *Liliaceae* family and is commercially grown in India for cut flowers. Recently, this crop has become popular in many states of India.

Lilies have a very good demand in the flower market as cut flower and pot plants. Out of the different types of lilies, Oriental and Asiatic hybrid lilies and Asiatic hybrid lilies and to some extent, the Easter and tiger lilies are the most popular ones as they are excellent cut flowers. The popularity of these lilies is gradually increasing in India. Some varieties resistant to leaf scorch should preferably be selected for commercial cultivation.

Lily is a common name used for several different plant species. But day lily, calla lily, toad lily, and surprise lily are not “true lilies.” True lilies are members of the genus *Lilium*. They originate from underground bulbs and produce large, showy blossoms in the summer. True lilies are excellent plants for almost any garden situation. They are not only versatile and durable, they also offer gardeners a wide variety of heights, flower forms, and colours. In fact, their presence in the garden is so striking that they are often called the “Queen” or “Grande Dame” of the summer garden.

## Varieties

Arbatax, Nello, Tresor and All Choice are the important cultivars of *Lilium*.



## Soil and Climate

Soil with good texture and proper drainage is preferred. The soil should be light and porous but rich in organic matter. Lilies are sensitive to high concentration of salt which adversely affects the plant growth. The soil used for cultivation of lilies, has to be in good structure particularly the top layers and should also be kept well drained during the entire growing period. Maintaining the correct pH of the soil plays a major role in the root development and uptake of nutrients. It is advisable to maintain a pH of 6 to 7 for the Asiatic and longiflorum hybrid groups and a pH of 5.5 to 6.5 for the oriental hybrids.

For good plant growth and quality flower production, the night temperature should be around 10-15°C and the day temperature should be 20-25°C. Higher temperature will

produce a dwarf crop with less number of flower buds per stem. The plant should not be grown under direct sunlight. In summer months, due to high light intensity, the plants become stunted in growth. A shading screen with 50-75% shade will be beneficial.

### Sowing/Planting

As a thumb rule, the bigger the bulbs, more is the stem length and the number of flower per stem. Bulbs less than 10-12 cm in circumference should not be used for flower production in Oriental hybrid lilies, where as bigger bulbs (as big as 22-24 cm) should be planted for production of Asiatic lilies.



### Sowing on Beds

#### Planting Density

Bulb Size (cm)	Bulbs/m <sup>2</sup>	Planting Distance (cm)
08 - 10	49	15 × 15
10 - 12	42	16 × 15
12 - 14	36	16 × 18
14 - 16	36	16 × 18

### Planting Depth

It is important, that the bulbs are healthy and should have well formed and healthy roots before planting because the water and nutrient absorption during the first three weeks is dependent on these roots. When the shoot emerges the so called stem roots start to

develop on the stem just above the bulb. These stem roots instead of bulb roots will soon start supplying water and nutrients to the plant. In order to get excellent quality flowers, the stem roots should be allowed to develop properly. The depth of planting should be 10 – 12 cm winter.

### Fertilization

Since liliun is a bulbous crop, most of its nutrients are already present in the bulb itself. Liliun is a very salt sensitive crop and therefore one should take care while applying fertilizers. It is advisable to apply 12:61:00@ 2kg/100m<sup>2</sup> at least one week before plantation. Later on during the first three weeks when the stem rooting takes place, no additional fertilizers are required. Good root development is important at this stage.

Three weeks after plantation- Calcium Nitrate @ 1 kg/100m<sup>2</sup>

Six week after plantation- Potassium nitrate @ 1kg/100m<sup>2</sup>

If plant show symptoms of weakness during growing period due to Nitrogen deficiency then a top dressing of Ammonium Nitrate@ 1 kg/100 m<sup>2</sup> can be applied up to three weeks before harvesting.

### Irrigation

Irrigation is one of the most important factors that promote growth in the cultivation of lilies. Soil is watered before planting the bulbs. After planting the bulbs water is given liberally so that the soil properly adheres to the bulbs and roots. Since the stem roots develop in the top soil, it is essential that this top (30cm) soil should be kept continuously moist. However, there should not be any water stagnation. During the dry spell, the water consumption may be as high as 10 litres/m<sup>2</sup>/day.

### Staking

Staking is an important operation in lilly cultivation to keep the plants erect. The most practical way to support the crop is by using

netting which should be gradually raised as the plants grow in height so as to get long stems during harvest.

### **Harvesting**

Flowers are ready for harvesting between 90- 120 days after planting. As soon as first bud shows distinct colouration, the lilies should be harvested. If this is done at a premature stage, the buds will not develop properly. Cutting too late *i.e.* when the bulbs have opened fully will cause damage to the flowers during transit. Cut stems should be placed in cold water immediately after harvesting. If necessity arises, the flowers can be stored at 2-5°C for a week or so. Sucrose @ 5% + HQS @ 200 ppm significantly increase the vase life of the flowers.

### **Grading**

After Harvesting, the lilies are usually sorted by number of flower buds per stem and length of the stem. The leaves from the bottom 10-15 cm of the stem should be removed to improve the keeping quality of the flowers.

### **Nutrient Deficiency**

#### **Iron (Fe) deficiency**

##### **Symptoms**

The leaf tissue between the veins of young leaves becomes yellowish-green, particularly in plants with rapid growth. The greater the iron deficiency the more yellow the leaves look.

##### **Management**

- Soil should be well drained with low pH level
- Chelated- Fe should be applied @ 2-3 gm/ m<sup>2</sup> before planting and maximum 2 gm / m<sup>2</sup> after planting.

#### **Nitrogen (N) deficiency**

##### **Symptoms**

The whole leaf becomes lighter in colour and this is often more noticeable when plants

are about to bloom.

The plant often seems rather light green in appearance. Soil with a low nitrogen level produces a crop with stems which are lighter in weight with less number of flower buds. The foliage in the vase will turn yellow more quickly.

##### **Management**

- Always apply sufficient quantity of nitrogen, preferably based on the results of soil sample.
- If the nitrogen deficiency is diagnosed during cultivation apply an additional rapid action nitrogen fertilizer. However, bear the risk of leaf scorch in mind during this procedure and make sure the crop is always washed off thoroughly.

### **Abnormalities**

#### **Leaf Scorch**

Leaf scorch occurs when there is a disturbance in the balance between absorption and evaporation of water.

This is the result of inadequate absorption or evaporation which causes a calcium deficiency in the cells of the youngest leaves. Cells are destroyed and eventually die. A sudden change in the relative humidity inside the greenhouse also affects this physiological imbalance that leads to poor root system and high salt level in the soil. Large bulbs are more susceptible than smaller ones.

##### **Management**

- Disease and pest which could damage the roots should be controlled effectively.
- Soil should be moistened before planting.
- It is better not to use susceptible varieties but if this cannot be avoided do not use larger bulbs as these are extra sensitive.
- Plant bulbs with a good root system.

- Plant to an adequate depth i.e., allow 6-10 cm of soil on top of the bulb.
- Prevent large differences in greenhouse temperature and air humidity levels during period of increased susceptibility. Try to maintain RH level of approx. 75%.
- Ensure that plants maintain even transpiration and avoid excess transpiration by shading.
- Rapid growth must be prevented.

## Diseases

### Bulb and Scale Rot

This disease is caused by the fungal pathogens. Plants affected by these diseases are retarded in growth and the leaves have a pale green colour. The under-ground part of the stem may show orange-brown to dark brown stains, which afterwards become larger and spread to the inside of the stem. The infected bulb's scales will show dark brown stains and the rotting starts at the base of the bulb and scales. The plant finally dies prematurely.

To prevent the diseases, bulbs should be planted in pre-sterilised soils. Bulbs should be dipped for one hour in 0.2% captan + 0.2% benlate to minimize the disease infection. Also keep the soil temperature as low as possible during the entire period of cultivation by frequently irrigating the field.

### Foot Rot

This is caused by the *Phytophthora* fungus. The infected plants have violet –brown spots spreading upwards. The plants are retarded in growth or may wither suddenly. The leaves start turning yellow from the bottom of the stem.

To control the diseases, sterilize the soil before planting the bulbs. Dithane M-45 may be applied @ 200g / 100 m<sup>2</sup> as soil drench.

### Root Rot

This disease is caused by the fungus *Pythium*. These fungi prefer moist condition

and thrive best at 25–30°C. The infected bulbs and stem roots show light brown spots and signs of rotting. The infected plants remain short in height leaves are narrow and dull in colour. Such plants will show more bud drop than normal plants. The flowers are smaller in size and often do not open fully.

The soil should be disinfected chemically. The affected plants may be sprayed with Dithane M-45 @ 0.2 %.

### Leaf Spot Disease

Leaf Spot disease is mainly caused by *Botrytis* under moist condition. *Botrytis* produces spores which are spread by rain and wind to nearby plants. Under dry condition the disease will not spread. When infected, the leaves show dark brown spots of 1-2 mm diameter which will increase in size to form round or oval spots. The affected leaves and flowers will ultimately die.

To manage the diseases, reduce irrigation to make the soil dry. Spray Benlate @ 5gm per 10 m<sup>2</sup>.

### Virus Diseases

Lilies are infected by different types of virus viz., Lily Symptomless Virus, Cucumber Mosaic Virus, Tulip Colour Breaking Virus etc.,. The plants raised from virus infected bulbs become weak in vigour and produces inferior quality flowers. In case of severe infection, the plants become stunted and deformed. For production of quality flowers diseases free bulbs should be used.

### Insect pests

#### Aphids

Aphids live only on young leaves particularly at the backside of the leaves. Young buds may also be affected resulting in deformed flowers. Spray Nuvan @ 2ml/litre of water.

#### Thrips

This is also a sucking type of insect. A

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severe attack will adversely affect the plants growth and flowering. Those flowers will not be accepted in the market. Regular spraying with Monocrotophos @ 2 ml/litre of water will protect the plants from the attack of thrips.

### **Post-Harvest Management**

Immediately after harvest, the lower portion of the cut spikes should be immersed in water for prolonging the vase life of spikes. A holding solution consisting of silver nitrate (50 ppm) + 3 % sucrose is best to extend vase life, delaying leaf senescence and enhance post harvest keeping quality of *Lilium* cut flowers. Among the varieties evaluated, Brindisii had a vase life of 8.33 days followed by Serrada (8.03). Silver nitrate recorded longest shelf life (9.47 days) which was closely followed by Citric acid (9.00 days) and control treatment recorded a shelf life of 7.33 days. Interaction effects between varieties and treatments revealed that Serrada flower pulsed in silver nitrate 50 ppm + 3 % sucrose could keep well for 10.60 days which was closely followed by Brindisii pulsed in citric acid (10.20 days).

### **Conclusion**

Flowers celebrate love, comfort in sorrow, congratulations in achievement and friendship. Flower messages have varied over the centuries. Flowers are true symbols of love, and thus, they are the perfect gift to give to your loved ones on special occasions. You can give flowers to anyone on almost every occasion because they are everyone's favourite. Whether you can wish your friend a happy birthday or honour your mother on Mother's Day, the bouquet of flowers can never be wrong. Even if you are going to surprise your lover on Valentine's day, you can choose Flower Basket as a Valentine gift for her or him. They can be used in herbaceous borders, woodland and shrub plantings, and as patio plants. Some lilies, especially *Lilium longiflorum*, form important cut flower crops. These may be forced for particular markets; for instance, *Lilium longiflorum* for the Easter trade, when it may be called the Easter lily.

