GROWING LILIUMS IN THE FOOTHILLS OF WESTERN HIMALAYAS

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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 to some extent the Easter and Tiger lilies are the most popular ones. All these lilies are excellent cut flowers. The popularity of these lilies is gradually increasing in India. Some varieties are prone to leaf scorch and as a result are not accepted in the market. Hence, varieties resistant to leaf scorch should preferably be selected for commercial cultivation.

LOCATION:

Lilies should be grown preferably under semi-shady conditions and on the sites having no danger of frost and strong winds. Arrangement of shading nets is also necessary to reduce the light intensity.

SOIL:

Soil with good texture and proper drainage should be prefered. 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. A soil pH between 5.5-7.0 is ideal.

In order to reduce the chance of disease infection, the soil should be sterilized before planting the bulbs. Formalin @ 2% may be used to sterilize the soil.

TEMPERATURE:

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.

LIGHT:

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.

BULB SIZE:

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

PLANTING TIME:

In the western Himalayan region, lilies can be planted throughout the year except the monsoon, when due to heavy rains the chance of bulb rotting is very high.

Lilies can be planted in the plains in the month of October - November. Only the sprouted bulbs should be planted.

PLANTING DENSITY:

The planting density varies from type to type, cultivars and bulb size. Planting density is also dependent on the planting time. In summer, the bulbs can be planted more densely as compared to winter planting. Usually bulbs are planted 15 cm apart in a row and the distance between the rows is 30 cm. Approximately 28 bulbs are planted per m^2

PLANTING DEPTH:

It is essential, that the bulbs 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 under- ground part of 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. For winter plantations, the depth of planting should be 10 -12 cm and during summer it should be 12 - 15 cm.

MANURING:

Well rotten FYM should be mixed to the soil @ $1m^3$ per $100m^2$ area. In heavy and more humus rich soils, FYM will often have an adverse effect on the soil structure as a result of its cementing action.

Liliums need minimum nutrition, particularly during the first three weeks of the crop. Soil low in nutrient content should have phosphorus and potash as basal dose. $CaNO_3$ (CAN) @ 1kg per $100m^2$ should be applied three weeks after planting the lilies. Subsequently, when the plants are in active vegetative growth, the second dose of CAN should be applied @ 1 kg per $100m^2$.

IRRIGATION:

Irrigation is one of the most important factors that promote growth in the cultivation of lilies. Soil is watered before planting the bulbs. Water liberally a few times after planting the bulbs 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 (30 cm) 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^2 per day.

STAKING:

Staking is essential to keep the plants erect. The most acceptable way to support the crop is by using netting, which should be gradually raised as the plants grow in height.

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 buds 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 increases the vase life of the flowers.

GRADING:

After harvesting, the lilies are usually sorted by the 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. This will improve the keeping quality of the flowers.

DISEASES:

Bulb and Scale Rot:

This disease is caused by the fungal pathogens *Fusarium* and *Cylindrocarpon*. Plants affected by this disease 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 scales will show dark brown stains and the rotting starts at the base of the bulbs and scales. The plant finally dies prematurely.

To avoid the disease, bulbs should be planted in pre-sterilized soils. Bulbs should be dipped for one hour in 0.2% Captan + 0.2% Benlate to minimise 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 fungus *Phytophthora*. The infected plants have violet - brown spots spreading upwards. The plants are retarded in growth or may wither suddenly. The leaves become yellow; starting at the bottom of the stem.

To control the disease, sterilize the soil before planting the bulbs. Dithane M-45 may be applied @ 200 g per 100 m^2 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%. Soil drenching with Dithane M-45 @ 0.2% will also be beneficial.

Leaf Spot Disease:

Leaf spot disease is mainly caused by *Botrytis* under moist conditions. *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 control the disease, reduce irrigation to make the soil dry. Spray Benlate @ 5 g per 10 m^2

Virus Diseases:

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

For production of quality flowers disease free bulbs should be used.

INSECTS AND 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.

To control, dust 3 g of Aldicarb (Temik) per m^2. after the first shoot appear. Spray Malathion, Rogor or Endosulfan @ 2 ml/ litre of water.

Thrips:

This is also a sucking type of insect. A severe attack will adversely affect the plant growth and flowering. Those flowers will not be accepted in the market. Regular spraying with Endosulfan, Monocrotophos, Malathion etc. @ 2 ml/ litre of water will protect the plants from the attack of thrips.

VARIETIES FOR HILLS:

A number of lilium varieties have been found to grow well in lower and mid hills of western Himalayas.

Asiatic Hybrid Liliums:

Adelina, America, Brunello, Chianti, Chicago, Gran Paradiso, London, Marseille, Minstreel, Mona, Nove Cento, Pollyana etc.

Oriental Hybrid Liliums:

Alhambra, Amanda, Atlantis, Cascade, Kiss-proof, Mediterannee, Marco Polo, Star Fighter, Star Gazer, White Merostar etc.

Longiflorum Hybrids:

Avita, Snow Queen, White Fox, White Satin etc.

Tiger Lilies:

Single and Double.

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March, 1999

Designed & Printed at
Azad Offset Printers (P) Ltd
144 Press Site, Ind. Area 1,
Chandigarh 160 002
Tel : 0172-652349, 654411