



BULB PRODUCTION IN LILIES AND TULIPS

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LILIES

Lilies (*Lilium* sp.) are among the top 10 flowers of the world owing to their attractive flowers and excellent vase-life. Among the different types of lilies, the Asiatic and Oriental hybrids have attractive flowers of different hues. In addition to the beauty, the Oriental and *L. longiflorum* hybrid flowers have also very pleasant fragrance.

BULB:

The lilies have non-tunicated bulbs. The bulbs consist of numerous fleshy scales attached to a compact stem or basal plate. Usually one large daughter bulb and 2 or 3

bulblets are produced every year. These small bulblets, within a period of 2 to 3 years, become commercial large sized bulbs with a circumference of 15-20 cm.

METHODS OF PROPAGATION:

Lilies are multiplied through seeds, bulbils, underground stem bulblets, division of the bulb and by use of bulb-scales.

PROPAGATION THROUGH SCALES:

Commercially, lilies are propagated through scales or tissue culture of scales. Propagation through scaling is a simple, cost-effective and rapid method to increase a clone of a particular cultivar within a short time. It also has a cleansing effect and diseases can be controlled appreciably.

The bulbs selected for scaling should be as clean as possible. The soil adhering to the bulb should

be washed off. The best results are obtained by selecting the largest bulbs from the stock of true to type free from visible signs of any disease. Usually the outer two rows of firm scales are collected for the propagation of the plant. The inner scales, being soft and small, are more likely to rot off as compared to the outer scales. The scales are broken off carefully at the basal plate to facilitate good production of bulblets. As a preventive measure, dip the scales in a solution of 0.2% Captan + 0.2% Benomyl to minimize the disease infection. The scales should be kept in a condition that will prevent any dehydration. The scales treated with fungicides are planted in moist sand inside the mist propagation chamber in September/ October. In 3-5 weeks, one or more bulblets will develop on the base of each scale. More number of microbulbs (5-10) per scale may be obtained if the scales are treated with low

concentrations (10 and 100 ppm) of plant growth regulators viz., Kinetin, IBA. If more number of bulblets are produced per scale, the individual



Mother bulbs, scales and bulblets produced from the scales.

bulblets will be smaller in size and will require more care and attention. By adopting this technology the multiplication rate could be increased by 25-30 times under *in vivo* conditions as compared to the usual production of 2 or 3 bulblets per bulb.

TIME SCHEDULE OF PROPAGATION THROUGH SCALING:

1st Year:

Sept-Oct : Treated scales are planted in a propagation chamber, with a temperature of 25°C, light intensity of 40 Klux (approx.) and humidity 90-100%.

Nov-Dec : Micro-bulbs (4-6 mm dia.) harvested from

the propagation chamber are transplanted in the polyhouse.

Jul-Aug : Bulblets (10-12 cm circumference) are



Formation of Micro-bulbs on detached scales under *in vivo* conditions.

harvested and subjected to low temperature ($8\pm 1^\circ\text{C}$) treatment for 10-12 weeks.

2nd Year :

Oct-Nov : Forced bulblets (10-12 cm) are planted in the polyhouse. Recommended cultivation practices are followed. The plants treated with different growth retardants viz., CCC (2-chloroethyl trimethyl ammonium chloride) @ 1000 ppm or Alar or B-nine (N-dimethyl amino succinamic acid) @ 2500 ppm and Tracel (a trade formulation of micro-nutrients) @ 4 g/l of water alternately at an interval of 3 weeks for 3 times to get bigger bulbs. The flowers should be nipped at the emergence stage. Lily bulbs (15-20 cm) become

ready for harvesting after one year from the polyhouse in Sept-Oct.

INSECT-PESTS:



Micro-bulbs growing in the Polyhouse.

Aphids and thrips cause damage to the lily plants. Regular spraying with Endosulfan, Monocrotophos, Malathion etc. @ 2 ml/l of water will protect the plants.

DISEASES:

Among the different fungal diseases, the Bulb and Scale Rot caused by *Fusarium*, Foot Rot by *Phytophthora*, Root Rot by *Phythium* and Leaf Spot by *Botrytis* are major ones. The bulbs should be dipped for one hour in 0.2% Captan + 0.2% Benomyl solution before planting. Lilies are also infected by different viruses. As there is no chemical control for virus infection of plants, only disease free bulbs should be used.



TULIP

Tulips occupy a prominent position among the top 10 flowers of the world. In the international flower market, tulips command good demand on account of their elegant flowers of different hues and shapes. Tulip is a temperate crop and the bulbs require a cold temperature regime for flower initiation. Tulips are less influenced by light. However, under Palampur conditions, partial reduction in sunlight results in healthier plants with longer flower stalks. Tulips prefer light soil with a low salt content and pH of 6-7. Well decomposed FYM should be mixed @ 5-10 kg per m², depending on the soil condition, to enrich the soil. Plants can be grown outdoor and under green house conditions. To get a good crop of flower, bulbs of 10-12cm size or more should be planted

15cmx30cm apart. The tunics should be removed before planting the bulbs. The flowering plants will produce 4-6 leaves. Smaller (less than 6-8 cm) bulbs will produce plants with single leaf and will not produce any flower until the bulbs reach proper size. Recommended cultivation practices are followed to get quality flowers.

BULB:

A mature tulip bulb consists of five to seven tunicated scales attached to the basal plate. The outer bulb scales are generally fleshy and contain reserve food material. Axillary bud is formed on the basal plate in the interior of each tunicated scale. Usually most of the axillary buds abort and only 2 or 3 bulblets develop annually along with the daughter bulb. In late spring or early summer, growth of the new daughter bulb is complete. After the flowering, the old mother bulbs disintegrate and are replaced by a cluster of new bulb and bulblets, which were initiated during the previous flowering season. Largest of these bulbs, the daughter bulb, may attain the flowering size within one year, but smaller

bulblets require 3-4 years, depending on the size and cultivar.

PRODUCTION OF LARGE BULBS:

The agro-climatic conditions of Palampur is congenial for growing tulips. However, the production of large or commercial sized (10-12 cm or more) bulbs capable of producing marketable flowers is a major problem as observed in many parts of the world.

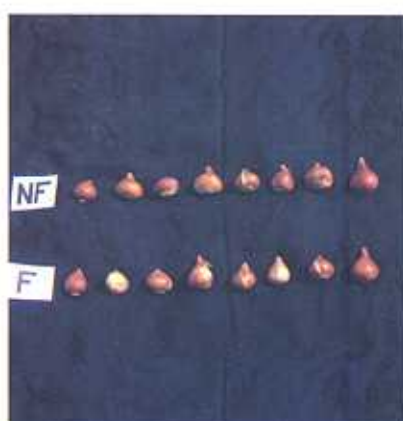
Deflowering at bud initiation is partially beneficial in increasing the bulb size. Foliar applications of CCC 1000 ppm with Tracel 4g/l immediately after removal of the flower buds at green bud stage shows marked increase in number, weight and circumference of bulbs and bulblets. Two to three foliar applications of CCC and Tracel at an interval of 3-4 weeks result in larger bulbs.



Forced bulbs planted after sprouting in field.



Removal of tunics before planting bulbs.



Beneficial effect of deflowering (NF) over flowering (F) on bulb size.



Beneficial effect of forcing. Forced bulbs in front, unforced bulbs not yet sprouted.

FORCING:

For uniform and proper flowering, the bulbs should be subjected to low temperature treatment, which is known as forcing. Care should be taken that the bulbs should reach the 'G' stage (gynoecium clearly visible on dissection) before forcing the bulbs, otherwise flower may abort. Depending on the temperature (5°C / 9°C) and duration (10-15 weeks) of the forcing treatment, the plants will flower either in December or in early February.

INSECT-PESTS:

Tulips are often infested with aphids. Application of recommended doses of Endosulfan, Malathion, Aldicarb etc. will be beneficial in controlling the attack. Other insect-pests are of minor importance.

DISEASES:

Tulips are affected by a number of diseases. *Fusarium* infection causes a 'sour' smell from the bulbs and the appearance of a white mould on tunic. Removal of tunic reveals soft infected bulbs. The bulbs, badly damaged by the fungus, become hollow and light in weight. A preventive dip and soil drenching with 0.2% Benomyl is recommended. *Botrytis* infected plants show the presence of brown spots on the leaves, flowers or even on bulb. The bulbs should be treated with 0.2% of Benomyl, Captan and Dithane M-45. *Pythium* infection will cause Bulb or Root Rot. A preplant dip in 0.2% Benomyl is recommended. Many viral diseases also affect tulip plants. They produce stripes on the leaves or flowers. In severe

cases, stunting or deformation of plants may occur. Till date there is no remedial measure to control virus infection of plants and only disease free plant materials after virus elimination should be used.

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