



GOVERNMENT OF GOA
DIRECTORATE OF AGRICULTURE
Tonca, Caranzalem-Goa



Cultivation of Flowers

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ANTHURIUMS

Anthuriums are popular for their excellent keeping qualities of 15-20 days as cut flowers. They prefer high relative humidity not less than 60% and partial shade with a temperature of 25°C - 28°C for their growth. The climate along the coast is highly suitable for their cultivation. The anthuriums are available in various colours.



Propagation: The traditional method of propagation is by stem cutting with few aerial roots or by suckers. But not for commercial purpose or by separation of basal sprouts. However, tissue culture propagation is now commonly adopted. Seeds are also used for multiplication.

The plants selected should have a compact canopy and produce profuse suckers. The flower stem should be erect and long with about five times, the length of the spathe.

Planting : Highly organic well-aerated medium with good water holding capacity and excellent drainage is essential. The media used are coarse sand + charcoal + coir pith or coconut husk and small brick pieces. The pots are filled to about ¼ capacity with manure as above. As the plants grow, fresh medium is added to the pot. The young plants require topping up every year, while adult plants require it every 2 years. Regular irrigation preferably by micro sprinkler is essential.

Anthuriums can also be grown as a ground plant by planting on raised bed at a spacing of 30 x 30 cm. or 45 x 45 cm. in specially prepared media as above. They can also be grown in poly house or shade house. About 3000 - 4000 plants could be accommodated in 1000 m² area.

Manuring

About 10 gms. of 15:15:15 of N:P:K once in three months is applied to the soil per plant. A foliage spray with N:P:K at 0.5% to 1.0% could also be given to improve the flower quality. Fertilizers rich in calcium and poultry manure are very helpful.

Plant Protection : Common diseases are bacterial leaf blight and leaf spots, which can be controlled by spraying fungicide carbendazim (Bavistan) @ 1 gm. in 1 litre of water or Diathane Z - 78 @ 3 gm. per litre of water. Precaution of avoiding water stagnation in rainy season should be taken to avoid root rot. For insects like mites, calethene or monocrotophos @ 2ml/litre can be used.

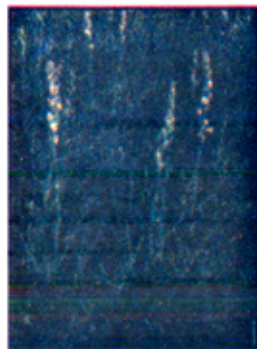
Pruning of older leaves, cleaning of crowns before brains all the operations to be carried out for better growth & flowering.

Harvesting : The anthurium bear flowers after about 10 months of planting when they bear about 5 - 7 leaves. Each plant bears 5 - 8 flowers or spathes in a year.

The flowers are harvested after unfolding of spathe is completed with its long stem when $1/4^{\text{th}}$ to $3/4^{\text{th}}$ flowers on the spadix are open, indicated by the change in colour. Normally flowers are harvested in the morning keeping long stalks. The basal portion of stalks of flowers is kept in water as soon as possible to prevent drying out and trapping of air inside the stalk.

TUBEROSE

This is one of the most important bulbous flowering plant and is used in the preparation of garlands and bouquets. They are available in single and double flowered types. The flowers have good keeping quality. The crop once planted can be maintained upto 3 years after which it is required to be uprooted.



Climate and Soil : High atmospheric humidity and a temperature of around 30° C is optimum for this crop. It should be grown in open conditions.

It can be grown in any type of soil from light sandy loam to clay loam. A soil pH of 6.5 - 7.5 is ideal. The soil should be rich in organic manure. However soils infested with nut grass or hariyali should be avoided.

Propagation and Planting : Land should be dug upto a depth of 45 cm. Bulbs are planted at a depth of 4-5 cms. at a spacing of 20 x 30 cm. Bulbs should be treated with copper fungicide before planting. Planting of bulbs can be done in May - June or September - October as long as there is no water stagnation. The seed bulbs can be obtained from plants 4 - 5 weeks after harvest. They are dried in shade for 2 - 3 weeks before planting. Bulbs of boat shape with 2-3 cm. size are preferred. Bulbs of 30 gms. weight produce flowers after 50 days of planting while 45 gms. weight produce after 60 days. One bulb is planted at one place. About 1000 bulbs are required per 1000 m².

Manures : 25 tonnes of organic manure per ha. is essential. The N:P:K requirement is 200:200:200 kgs. per ha. Out of this half of N:P & K are to be applied at the time of planting and remaining is applied when the flower stalks appear.

After Care: Mulching with dry grass, chopped straw; helps in controlling weeds and conserving moisture. Earthing up operation enables spikes to grow erect. No major pests and diseases are found to attack tuberose. Irrigation is essential every 3 days in summer and 4-5 days in winter. Water stagnation should be avoided.

For ratoon crop, stop irrigation for one - two weeks after full harvest. The light earthing up and manuring is required to be done followed by restarting of irrigation. The second and third year production is nearly more than the first year.

Harvesting, Grading and Packing : Tuberose is harvested by cutting the spike from the base when few flowers open on the spike. Picking of loose flowers for marketing is done early in the morning. Do

not cut the leaves alongwith spikes. The spikes can be packed in banana leaves or paper for marketing. About 8000 spikes could be obtained from 1000 m² area.

Harvesting of Bulbs : Bulbs reach maturity at cessation of flowering during winter. At this stage, irrigation is withheld and soil allowed to dry. The leaves become dry and bulbs attain dormancy. The bulbs are dug out and separated and used as seed stock for the next season.

GLADIOLUS

Gladiolus is a seasonal flower grown from the thickened lower portion of the stem called corm. The large erect flower stalks and colourful varieties make it one of the most important flowers for bouquets and for cut flowers.

Propagation and Planting : Gladioli are propagated by means of corms with girth of about 6 cm. Corms are dipped in carbendazim and kept in a dry place prior to planting. They come up well in rich loamy soils with good drainage. Soil pH of 6 - 7 is ideal.



Cool climate is desirable for its growth. Planting could be done from August - September. Corms are planted on flat beds or raised beds. Planting in shady/salt affected areas should be avoided. The corms/bulbs are planted at a depth of 10 cm. at a spacing of 20 cm. between the plants and 30 cm. between rows. The plants should not be over watered and also complete drying of soil around the corm is to be avoided. Irrigate at interval of 2 - 3 days depending on soil and water conditions. For commercial success crop needs to be cultivated continuously with a regular interval of planting. About 10,000 corms are required per 1000 m² per hectare.

Manuring : 50 tones FYM is to be applied to the soil before planting per hectare. The recommended fertilizer dose is 60:125:125 NPK out of which 150:150 P:K is required to be given as a basal dose at the time of planting and N is given in 3 doses at 2 - 4 and 6 leaf stage. A light earthing up should also be given at the time of application of fertilizer.

Plant Protection : For control of thrips, endosulphan or monocrotophos can be sprayed while carbendazim @ 1 gm/litre water can be used for fungal attack. The major problem in cultivation of gladioli is that excess watering results in decomposition of corms and wilting of plants.

Harvesting : Flowering starts about 60 - 75 days after planting depending on the temperature, size of the corm and variety. The spike is cut with two leaves at the bottom of opening of one to two flowers. Flowers are harvested in morning hours. The plants after harvest of flower are left undisturbed in the field without water for atleast one month. After the leaf starts yellowing, the corms are uprooted and dried in the shade. Harvested corms should be dipped in fungicide like carbendazim, dried and stored in cool condition. For getting better corms, the field should be drenched with copper oxychloride solution 3 gm. in one litre water alongwith 2 kg. Diamonium Phosphate, 2 kg. Potassium Sulphate in 100 litre of water. The cormals should be separated and could be used for further growth.

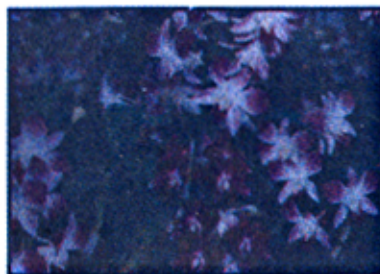
They are put on raised bed with rich soil for their growth for 2 generation after which they attain a size of more than 4 cm. girth and could be used for flower production. The bigger corms are dried in shade after uprooting for about 1 month. They should be then dipped after cleaning in carbendazim or captan solution 2 gm. in 1litre of water dried in shade for one day. The corms should be stored for atleast 2 to 4 months in cool place preferably cold storage or in the clean sand in cool & dark room. Gunny bags should be used for their packing to maintain aeration of bulbs. One hectare of gladioli farm gives 70000 spikes, The cost of corm is recovered through the production of corms and cormlets for sale or replanting. The flower

spikes could be stored in cold storage upto 3 days if the market glut is noticed.

ORCHIDS

Orchid flowers are irregular and extremely variable in size and shape. Flowers consists of 3 petals and 3 sepals. They are one of the most beautiful flowers on the earth with excellent base life of nearly 3 weeks. Orchids need protection from direct sunlight; cold and hot

winds. They are specific in their requirement of temperature, light and humidity and therefore should be cultivated after ascertaining the requirement.



Propagation : Though these are propagated by root division of offset cuttings or seed, tissue culture is most commercial and reliable method. The best time of propagation is February - March when orchids growth gets activated.

Planting : Orchids require aeration, good drainage, humus and humidity. They are planted in earthen pots varying in size upto 2" having plenty of big holes. The growing medium should comprise of pieces of bricks, stones and charcoal mixed in 1:1:1 proportion. The bigger pieces of charcoal are put at the bottom. Terrestrial orchids require medium of sand + soil + compost. Do not move the pots unless unavoidable. Irrigation by micro sprinkler is essential however do not allow water stagnation in the pots.

Manuring : Orchids requires manuring in the form of liquid spray. The easiest and cheapest spray is 2% N : 0.5% P : 0.5% K and can be given during the active growing season every 15 days. The fertilizer spraying could also be prepared by mixing following chemicals in one litre of water.

1. Potassium Nitrate	584 mg
2. Ammonium Sulphate	98 mg
3. Magnesium Sulphate	453 mg

4. Monocalcium Phosphate	222 mg
5. Calcium Sulphate	1080 mg
6. Iron Sulphate	111 mg
7. Manganese Sulphate	56 mg

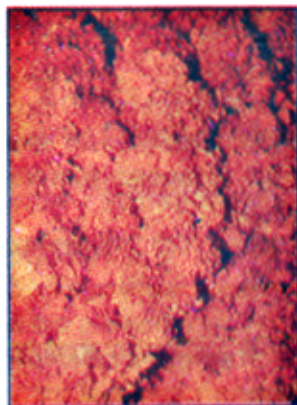
Gibberellic acid 3 at 1.5 p pm induces early flowering.

After Care : Plants should be watered 2 - 3 times a day. Plants should not be left too dry or damp. Fungi can be controlled by spraying Copper Fungicides or Benomil while thrips, ants etc. can be controlled by spraying monocrotophos.

Harvesting : The flowers are cut at a fully mature stage. The flower is cut at the bottom of the stalk without any leaves. The flowers last for one - three months on the plant and as a cut flower blooms, they remain fresh for one - four weeks. The value of flowers depend on size, colour and number of florets on each spike. About 5 - 8 flowers are obtained from a fully-grown plant per year. Five thousand flowers spikes are produced in a year from 1000 m² area.

MARIGOLD

They are the flowers of common man. They are in special demand at the time of Dussera and Diwali festivals. In summer during the marriage season when prices of other flowers rise, marigold is commonly substituted for garlands and for decorations. Nowadays various types and colours are available in this crop. As a mixed crop in vegetables or others, it helps in reducing spread of pests and soil nematodes.



Propagation and Planting: Marigold is propagated by seed. The seeds of selected types are raised on beds. One gram of seed

contains about 350 - 400 seeds. 1000 m² of area requires 100gm or 1 kg/ha. of seed. The seedlings get ready for planting after 25 - 30 days. Some hybrid and imported seeds produce excellent quality flowers and could be used. Some of the types are African Marigold, French Marigold and French Hybrid.

Planting is done at 60 cm. x 60 cm. for all varieties and 45 x 45 cm. for dwarf types. Planting could be done all the parts of the year.

Manuring : The marigold grows best with organic manure. Apply 25 tons of compost per hectare well before planting of seedlings. 50 kg N, 50 kg. P and 50 kg. K should be applied per hectare at the time of planting. After one month 50 kg. additional N should be applied as top dressing.

After Care : Plants establish within a week after planting. Light earthing up is given after a month. At this stage the tip of the plant should be nipped off. This induces more flowering. Regular irrigation is needed in summer months and when rains give a break.

Plant Protection : Endosulphan 3 cc in 1 litre of water or malathion 2 cc in one litre of water can control hairy caterpillar on the plants. The black spots on the plant could be controlled by spraying Dithane M 45 @ 4 gm per litre of water.

Harvesting : Flowers appear after 50 days and could be harvested from 60 days upto 90 days. Flowers remain fresh in polybags if stored in cool place upto six days. Water should not be sprinkled on flowers. About 10 tones of flowers could be obtain from one ha. of area.

CROSSANDRA - Abolim

These flowers are commonly used for garlands, venis, hairdos etc. They are available in very attractive colours i.e. red, orange or yellow.

This is a semi-shrub which is perennially evergreen and grows to a height of about 1.30 mt. Flowers are borne on terminal and axillary spikes.

Climate : These plants cannot tolerate very low temperature and grows luxuriously in warm, humid areas where the temperature is around 30°C. It can tolerate a certain amount of shade and grows well in well-drained soils. Rich, red, loamy soils with pH 6 - 7 are ideal for cultivation.



About 25 tones/ha of compost should be added to the soil per hectare. The seedlings/rooted cuttings are transplanted at 30 cm. distance on side of the ridge.

Fertilizer : Basal dose of 30:60:60, N:P:K should be applied in furrow before planting and followed by top dressing of N with 30 kg. twice a year.

Plant Protection : Nematodes are most common pests. Carbofuran 3 G @ 30 gms/sq. mts. help to control them. Pests and diseases can be controlled by use of monocrotophos and copper fungicide.

Harvesting : Crossandra continues to flower throughout the year with a drop in production during rainy season. The flowers are picked when fully open. The flowers remain on the plant for 3 - 4 days. Once they are plucked, they start fading in 36 - 48 hours. The plucking is done every alternate days. All the flowers in the spike do not open together. A good long spike will take 15 - 25 days for complete flowering. Harvesting of flowers start after four months of planting. One hectare of area produces about 500 - 700 kg. of flowers.

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