



Production Technology of Aromatic Cymbidium Species



**D. Barman, A. Mandal Khan
Raj Kumar and R.P. Medhi**

राष्ट्रीय आर्किड्स अनुसंधान केन्द्र

(भारतीय कृषि अनुसंधान परिषद्)

पाक्योड - ७३७१०६, सिक्किम, भारत

National Research Centre for Orchids

(Indian Council of Agricultural Research)

Pakyong - 737 106, Sikkim, India



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Compiled and Edited by

D. Barman, A. Mandal Khan, Rajkumar, Diki L. Lepcha, Udhav
Bhattraï, N. G. Debnath and R. P. Medhi

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Dr. R. P. Medhi
Director, National Research Centre for Orchids
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Cover Photographs

Front: (1st Row – L-R): *Cymbidium iridioides* and *Cym. munronianum*

(2nd Row – L-R): *Cym. Cyperifolium* and *Cym. dayanum*

Back: Brief introduction & objective of the book

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Foreword

Orchids are known for their unparalleled shape, size and color; normally remain fresh for longer period of time in comparison to other flowers. The economic importance of orchids lies mainly in their ornamental value but many orchids are used in fragrance and flavor industry. Most of the people are not familiar and unaware about the scent of orchids. Essential oils of orchids may be extracted by hydro-distillation, steam distillation, extraction with low boiling solvents and with liquefied gases. There are 23 species of Cymbidiums are reported in our India, of which some are scented. Most of the scented or fragrant species of Cymbidium are rare, threatened and endangered in nature. Knowing of climate factor and scientific method of cultivation will help the conservation of these valuable species.

This technical bulletin is outcome of research conducted by Dr. D. Barman under NAIP on various aspects of production technology of Cymbidium species like *iridioides*, *munronianum*, *hookerianum*, *cyperifolium* and *dayanum*. The authors have put their best effort to make the bulletin explanatory and handy. It has been scripted in such a way that it can be easily understandable to all.

It gives an immense pleasure to bring out this bulletin on "Production Technology of Aromatic Cymbidium Species".

hope this bulletin will be useful to the orchid growers, scientists and students as well as entrepreneurs' interests in growing fragrant orchids.

February, 2014
NRC for Orchids,
Pakyong, Sikkim



Dr. R.P. Medhi
Director

Preface

Fragrant orchids are a pleasure for their sweet fragrance and exotic appearance. Though floral scent is used by the plants for its survival mechanism, nowadays fragrance in orchids is achieving new importance as this characteristic adds to the aesthetic appeal of the flower spikes besides determining the consumer choice as well as market price. The scented species of cymbidium can be a added beauty in the flower vase, bouquet, corsages, wrath etc.

Fragrance of orchid is due to the presence of volatile aromatic oils produced in minute quantities on floral parts from sepals, petals, calluses, basal spurs to petioles. The oily fragrant substances change into vapour form enabling the flowers to smell. Only some of the odoriferous compounds released by a flower are detectable by human sense of smell but not all. Some orchids emit scent at morning while others develop fragrance at late noon, evening or night. Both quantity and quality of the released scent often shows a close correlation with time of the day, flower age and weather conditions.

I sincerely thank Dr.R.P.Medhi,Director, NRC for Orchids for his encouragement and support for writing this bulletin. I profusely thank Prof. S.N. Puri, V-C and Mission Leader (NAIP); Dr. P.K.Srivastava, Dean and Principle Investigator; Dr. S. N. Yadav, Associate Professor and Co PI, CAUPHT, Ranipool; Dr. Rajendra Gupta, Chairman, CIC(NAIP) for their continuous encouragement to bring publication of these unexploited crops. My sincere thanks are also for the

workers who nurtured these orchids as their baby.

This bulletin covers botanical descriptions, growing environment, package of growing practices, important diseases and insect pests and their control measures of aromatic Cymbidium species like *iridioides*, *munronianum*, *hookerianum*, *cyperifolium* and *dayanum*. I hope it will be helpful for the orchid growers in cultivating aromatic Cymbidiums scientifically and can increase their production qualitatively and quantitatively.



(D.Barman)

Pr. Scientist (Hort.) &CCPI (NAIP)

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Cymbidium iridioides D. Don.

Introduction

Cymbidium iridioides is an epiphytic and atrophic plant and it is best known as *giganteum*, this is another of the large flowered species. Cymbidiums are specially cultivated for cut flower and utilize for commercial purpose. These are best known orchids and there are incredible series of artificially produced hybrids. The blooms are widely utilized in the preparation of corsages, ornamental bouquets etc. The flower last well and can thus be sent long distance. These are commercially grown for the sale of plants and for the production of cut flowers.

Description of the plants



Cymbidium iridioides

Habitat: *Cymbidium iridioides* is epiphytic in nature.

Pseudo-stem: It is long, covered by sheathing leaf base, ovoid and slightly bulging.

Leaves: It has elongate, linear – lanceolate, expanded and acute equitant at base leaves.

Inflorescence: Inflorescence is raceme, sub erect and smooth type.

Peduncle: Peduncle is of type terete, smooth covered with oblong, lanceolate and acuminate bracts.

Rachis: Rachis is slightly angular, pendulous, smooth and dark green.

Floral bracts: Floral bracts are ovate-lanceolate with shortly acuminate tip.

Flower: Flowers are ochraceous yellow with warm – brown strips.

Sepals: Sepals are sub– equal ochaceous yellow with brown strips, smooth; the dorsal sepal elliptic-oblong, acute or sub – acute, slightly arched over column, the lateral pair not fully spreading, elliptic – oblong but slightly falcate, acute.

Petals: Petals are oblong – lanceolate, acute spreading.

Lip: The lip is 3 lobed, puberulous inside; lateral lobes erect, elliptic oblong, their apices directed forward, slightly curving in, obtuse with puberulous edges, with 4 longitudinal branched streaks on each lobe; the base of hypochile is narrow and smooth; the epichile oblong – ovate, obtuse, deflexed with undulating – crenate margin; hairy, dark purple blotched, parallel keels which run from the base of hypochile up to the base of mesochile; the median groove separating these lamellae is smooth.

Column: The column is curved, yellow with short dark purple strips on the ventral side and few on the dorsal side, with a nacteriferous sac at the base.

Anther: The anther is broader than long, slightly scabrid, with a

shallow median groove.

Pollina: Pollinia is ovoid, two inner one smaller, acute, orange yellow, diverging, sessile on a translucent white quadrate gland having two filial processes.

Flowering: Flowering season of *Cymbidium iridioides* is from October – November.

Habitat and Distribution

It grows on trees in dense forest especially in hollows containing decomposing vegetables matter. *C. iridioides* is widely distributed in Nepal, N. India (Kumaon, Assam, Sikkim, and Meghalaya), Bhutan, Burma & S W China (Yunnan, Sichuan, Xizang). Forest area of Dickchu, Rakdong, Tintek, Bhusuk and Rongliof Sikkim are the habitat of this species in around 1000-2000m altitude.

Cymbidium munronianum King and Pantl.

Introduction

Cymbidium munronianum was first collected by planting in the Teesta Valley in Sikkim, India, it was describe for the first time in 1895 this is closely related to *Cymbidium ensifolium*. *Cymbidium munronianum* is medium sized terrestrial plant. It flowers early winter to late spring. It consists of seven to eight sweet scented flowers, distantly placed on the receme, and measured about 2.5 cm across. Sepals and petals are straw coloured with fine dotted or streaked.



Cymbidium munronianum

Description of the plants

Habitat: *Cymbidium munronianum* is terrestrial in nature.

Pseudobulbs: Pseudobulbs are generally found enveloped in leaf sheaths however young pseudobulbs and leaves are enveloped in sheathing bracts.

Leaves: The leaves are linear, acuminate, erect and stiff and many nerved in nature.

Inflorescence: Inflorescence is erect from the base of pseudobulbs, tetertet and smooth.

Peduncle: It has long and lanceolate bract peduncle.

Rachis: Rachis is long with distant pedicellate flowers.

Ovary: It has pedicellate ovary ribbed smooth and green in colour.

Floral bracts: Floral bracts are lanceolate in nature.

Flowers: Flowers of *Cymbidium munronianum* are fragrant, smooth, pale-green with brownish-purple streaks.

Sepals: Sepals are sub-equal, spreading and the dorsal sepal are oblong and sub-acute while lateral pair is oblong, lanceolate and acute in nature.

Petal: Petals are oblong-ovate and sub-acute, pale green with brownish-purple streaks and smooth.

Lip: Lips are lanceolate, concave on the upper surface and the lateral lobes narrow, elongate and shallow, the disc with two parallel smooth lamellae in its center ending with the side lines white with purple dots whereas the apical lobe is oblong-ovate, sub-acute, reflexed and yellow with brownish purple dots.

Column: Column of *Cymbidium munronianum* is slightly curved and slightly winged, green inside with purple streaks.

Anther: Anther is oval shaped, yellow, translucent-yellow and bifid sessile on narrow gland.

Flowering: The flowering time of *Cymbidium munronianum* is December-May.

Distribution of the plant

It is found in Eastern Himalaya, West Bengal. In Sikkim it is found in Tharpu, Mangsari of West Sikkim. The species is rare in nature.

Cymbidium hookerianum Rehb.

Introduction

Cymbidium hookerianum was first described in 1851 under the name *Cymbidium grandiflorum*, based on a specimen collected in 1848 in Bhutan by William Griffith (a botanist from Ham in Surrey) whilst serving with a British diplomatic mission. Unfortunately the name *Cymbidium grandiflorum* had previously been used for a distinct species now placed in Pogonia. The next available and legitimate name for the species was *Cymbidium hookerianum*, based on living material collected by the British botanist Thomas Lobb in the early 1850s. *Cymbidium hookerianum* is large epiphytic or lithophytes and its inflorescence is more than 90 cm long dropping. It bears fragrant flowers.



Cymbidium hookerianum



Description of plant

Habitat: As *Cymbidium hookerianum* is an epiphytic orchid in nature it is found on trees in damp, shady forests or on steep banks or rocks often where thick moss cover occurs.

Pseudobulbs: Pseudobulbs of this species are generally enveloped in sheathing leaf bases, sheathing bracts at base and partially covering.

Leaves: Leaves are linear-oblong, acute, narrowed towards channeled base, expanded further towards equitant sheathing base, curved and many-nerved.

Inflorescence: Inflorescence is from the base of pseudobulbs and decurved.

Peduncle: It has long terete, smooth, sun erect, enveloped and oblong-lanceolate peduncle.

Rachis: Rachis is angular, smooth and pendulous.

Flowers: Flowers are pedicillate in nature.

Ovary: Ovary is pedicillate and smooth.

Floral bracts: It has oblong-ovate acute kind of floral bracts.

Flowers: Flowers are yellowish-green with lip spotted with brownish-purple dots.

Sepals: Sepals are sub-equal, spreading, pale green, externally glossy with a shed of brownish purple, internally pale green, coriaceous, with a few brownish purple spots at base; oblong-lanceolate, acute, incurved, concave; the lateral oblong-lanceolate, acute, somewhat falcate, margin incurved, the upper margin board and slightly curved reflexed.

Petals: Petals are oblong-lanceolate, acute, slightly curved margin spreading margin spreading and color same as sepals.

Lip: Lip of *Cymbidium hookerianum* is ochraceous yellow speckled with dark reddish-purple, 3-lobed, hairy with ciliate margin; andante to the basal of column to form nectar

producing sac; the lateral lobes erect, narrow, with oblique and acute apices; the disc between the lateral lobes with two parallel hairy keels dilated at the base; the apical lobe broadly oblong-ovate, deflexed with undulate margin and emarginated tip.

Column: Columns are slightly winged from the base to apex edges of lower half papillose, slightly curved, yellowish green, a few scattered dark purple spot on dorsal side and many dark purple streaks in front.

Anther: Anther is generally broader than long, sub-quadrate, cream yellow.

Pollinia: Pollinia are ovoid, acute, divergent orange – yellow sessile on a translucent quadrate gland.

Flowering: The flowering time of the species is February – May.

Distribution

Cymbidium hookerianum, a threatened species occurs in the Himalaya of eastern Nepal, West Bengal, Sikkim and North-eastern India, Myanmar, and in south-western China. In Sikkim it is found in Mensithang, Shipgear, Ratechu, Bhusuk, Rhigu, Rachela, Tendong, Moinum, Changey, Yuksom, Hee, Bursey and Bhareng area. It is found between 1,500 and 2,600 m above sea level.

Cymbidium cyperifolium Lindl.

Introduction

Cymbidium cyperifolium is a terrestrial plant, belonging to the family Orchidaceae. It flowers in the month of November and the flowers are fragrant, green in colour and become yellow with age. Inflorescence is about 30cm long, appears from the base of the pseudobulb and bears 3-7 flowers.



Cymbidium cyperifolium

Description of plant

Pseudo-stem: Pseudo stem of *Cymbidium cyperifolium* is thin and short in nature.

Leaves: Leaves are generally linear, finely acuminate, slightly expanded towards the sheathing leaf base and prominently three nerved.

Inflorescence: Inflorescence is usually 1 or 2 from the base of the pseudo-stem, erect; peduncle long, terete, glabrous and pale-green suffused with dark purple.

Rachis: Rachis is long terete, glabrous, pale green, suffused with purple with 3-7 pedicellate flowers.

Floral bract: It has long lanceolate, acuminate, nerved pale-green suffused floral bract with dark purple throughout; slightly

curved, striated and glabrous.

Flowers: Flowers are strongly fragrant, spreading, glabrous and bottle green in colour.

Sepals: Sepals are sub - equal, spreading, glabrous, 5 nerved, narrowly oblong, acute to sub - acute and slightly reflexed.

Petals: It has elliptic, acute, bottle green, glabrous, slightly arched over stamens kinds of Petals.

Lip: Lip is oblong, glabrous, dark green suffused with dark purple; lateral lobe narrow erect, pale green suffused with rich purple veins; apical lobe, elliptic, sub-acute, glabrous, bottle green with two dark purple strips, entire, partly deflexed and the disc between 2 side lobes with two smooth lamellae.

Column: *Cymbidium cyperifolium* has slightly curved, pale green glabrous column with dark purple streaks inside.

Anther: Anthers are generally dome shaped; pollinia obliquely ovoid, divergent, cleft to nearly the base and sessile on a very narrow long elongated gland.

Capsule: Capsules of *Cymbidium cyperifolium* are ellipsoid-clavate in nature.

Flowering: The flowering time of *Cymbidium cyperifolium* is November.

Distribution: India (NE India, Sikkim), Bhutan, China, Cambodia, Myanmar, Nepal, Philippines, Thailand. In Sikkim it is found in the area of Chungthang, Bop, Rabdentse, Youksoum and in Bakim at an altitude of 1500m to 2000m.

Cymbidium dayanum Rehb.

Introduction

Cymbidium dayanum is also known as “phoenix” orchid or tree orchid. It is epiphytic and small cymbidium with a distinct characteristic of fine foliage. 5-12 white flowers with red mid-vein are carried on a pendulous inflorescence. During its peak blooming period, numerous eye-catching inflorescences can be seen, though their flowers are short-lived. Peak blooming of the flowers is from August to September, but can be sporadic throughout the year when grown in tropical climates. *Cymbidium dayanum* occur on large tree branches, trunks and large fallen trees in shady locations of tropical rainforests.



Cymbidium dayanum

Description of plant

Habitat: *Cymbidium dayanum* is an epiphytic orchid

Pseudobulb: It has 4cm long pseudobulb.

Leaves: Leaves are generally linear, acute, sessile and not dilated at the base.

Inflorescence: Inflorescence is raceme, pendulous, smooth, angular; peduncle long, clothed with elliptic - oblong, acute, pale - green with dark purple nerved bracts up to the top and

often produces forwarded to cover the lower parts of raceme.

Rachis: Rachis of *Cymbidium dayanum* is smooth, angular and well-spaced pedicellate flowers.

Ovary: It has pedicellate ovary smooth slightly curved and terete with slightly grooved.

Floral bracts: Floral bracts are long triangular in nature.

Flowers: Flowers of *Cymbidium dayanum* is whitish purple and sweetly fragrant.

Sepals: Sepals are Sub-equal, white with purple median band, basal margin crenulate and the dorsal sepals are elliptic-oblong, margin slightly in folded at the acute apex.

Petals: It has elliptic-oblong, acute, conniving over the column and white but with central purple band petals.

Lip: Lip is 3 lobed, lateral lobes shallow, erect and white but with purple veins, blunt entire; the apical lobe ovate, apiculate, deflexed, with a large central yellow blotch surrounded by oblique purple band; disc with 2 longitudinal keels which starts from the base and goes to the apex of apical lobe, at base keels are broad, raised, glandular and hairy and at apical lobe keels are shallow.

Column: It has straight, slightly winged and dark purple column.

Anther: Anther of *Cymbidium dayanum* is yellow quadrate.

Pollinia: Pollinia is found to be yellow falcate ovoid, compressed, divergent and the quadrate, translucent-white.

Flowering: Flowering time of *Cymbidium dayanum* is August-November

Distribution: In India (Sikkim), Bhutan, Cambodia, China, Japan, Ryukyu Island, Philippines, Sumatra Taiwan, Thailand and west Malaysia. In Sikkim it occurs in Rhenock, Rongli area at an altitude of 600- 900m.

Growing Environment

Temperature

Natural species of orchids require a temperature regime under cultivation that is more or less similar to their places or origin or natural habitats. Ideal range for cymbidium is 10°C -25°C different between day and night temperature is ideal. The vegetative phase of cymbidiums starts from March onwards during which higher temperature about 20-25°C require for growth. Cymbidium can tolerate up to 30°C during summer months, but the night temperature should be come down to 15°C during the period of August to September. During this period they should go through cool period for floral primordial initiation. Cymbidiums whether species or hybrids like other orchids as such will give the highest potential flowering only in specific temperature difference of about 10°C between day and night temperature regimes, during flower emergence. While growing in cool growing house, day temperature should be range from 15 to 20°C in summer and 12-15°C in winter and night temperature should be 12 to 15°C in summer and 8-10°C in winter. The temperature can be control somewhat by opening and closing side vent.

Light

In subtropical and temperate climate orchids encounter extreme conditions of light. In the temperate climate zones relatively long daylight hours in the summer are replaced by short days during winter. Most important among all factors, quantity and more categorically the quality of light will determine whether cymbidium will bloom to its potential or bloom at all. Requirement of light of Cymbidium varies significantly from species to species. More important is the quality of light than quantity. Plenty or poor quality light will never make up for the quality of light. Cymbidiums normally should be exposed within 12h day light. The best clue about the light requirement of cymbidiums can be obtained from the knowledge of where it grows and under what situation. Cymbidium originates in Asia, where nights are sufficiently cool and days are bright; therefore, a high light condition is essential for their successful growing.

Most of the species grow best with 3000 to 4500 foot candles of light intensity. In green house 50% shade cloth overhead provides this light intensity under most conditions. Shading during the summer is requiring keeping the plants from burning. During the summer, the leaves should be a yellowish green, not a deep green. Plants grown in too much shade will usually be a dark, lush green and will usually not flower well. When the plants are in bud, some additional shade will improve the color. Too much light results in a brown or red stain on the exposed sections of the sepals which may give the flower a muddy color and is usually undesirable. High light usually improves the color of cymbidium flowers but the buds may

drop. Providing additional shade after the flowers open will hold the color and increase the flower life as well.

Humidity

The most important factor after light for successful orchids growing is the correct level of humidity. Most of the cymbidium does best in a Relative Humidity (RH) range 40%- 60%. More over orchids prefer a higher range of RH if the temperature is high. In green house or poly house this can be achieved by frequent overhead misting for brief period coupled with opening of the sides or running the exhaust fans. The opening of the sides will allow the fresh air inside, which will not only help to lower the foliar temperature but at the same time is an effective mechanism for protecting the plants from many common fungal and bacterial diseases that attack orchids under suffocated high temperature and high humidity condition. Humidity in the growing media is important for proper growth as humidity in air. If the air humidity is high, the amount of watering should be reduced. Sufficient humidity is required to prevent shriveling of pseudobulbs.

Production techniques

Watering

Water requirement by the epiphytes and terrestrial are also very different. Cymbidiums like lots of water and prefer to be constantly moist, but not wet. During the growing season, water thoroughly once or twice a week, more often in warmer or drier

locations. The amount of water will depend on the potting mix and the water quality. Yellowing of leaves are the indication of too much water. Condensation of fog on the plant surface may provide adequate moisture to the epiphytes. Porous mixes need more water than a heavy dense mix that retains a lot of water. Water thoroughly so that water runs through the pot and out the bottom. Watering heavily so that excess water flows through the potting mix is a process called leaching which helps to keep the excess salts. The quality of the water used for watering is also important. Water should be soft, low in sodium and free from chlorine. The pH value of 5 to 5.5 is best for watering cymbidium. Among the water rain water is the best not only for cymbidium but also for other orchids.

Feeding

Plant, whether grown in field or pots, take their nutrition from inorganic mineral. Plant nutrition, therefore, takes into account all inter-relationships of mineral elements present in the soil or soil less media, their availability to plant root. Optimum nutrition involves a complex balance of essential elements and other beneficial elements required for optimum growth. For cymbidium heavy and regular with balanced fertilizer is required. During planting, slow release fertilizer (13:13:13) of 6 monthly nature can be incorporated @ 5g/pot in the media. If not available, bone meal or neem cake (5g/pot) can be added to substrate. High nitrogen fertilizer during the growing season (February to August) and a low nitrogen fertilizer during the blooming season and winter are required. During vegetative stage 30:10:10 or 20:20:20 NPK@1g/l at weekly interval,

Calcium nitrate@0.5g/l, Magnesium sulphate @1g/l and micronutrient mix @1g/l at monthly improve the growth, however for flowering period, the NPK should be 10:20:20 or 10:30:30 @1.5-2g/l at weekly interval. The micronutrients requirement during flowering phase is same as vegetable phase.

Potting Mixture

The basic principles of potting media is must allow air and water to move through it; retain moisture and nutrition and above all durable. Further, epiphytic orchids require a growing media of less compact as compared to terrestrial orchids. Substrate should be available in local area. Cymbidium species of epiphytic nature can be grown coco chips/shredded tree bark, dried fern root and brick bits/stone chips (1:1:1:1). In case of terrestrial cocopeat can be added instead of cocochips. The size of particles of growing media should be smaller.

Sterilization of growing media

Most of the diseases get entry through media itself. Potting media requires sterilization and mixing homogeneously before filling in the pots. The commonly used methods for sterilization are heating and chemical treatment. The media needs to be cut smaller sized pieces and mixed thoroughly before sterilization. Some media require soaking over night e.g. coconut husk to leached out undesirable chemicals. If heat treatment is used all the media components should be sterilized separately as they require different period of heating. In case of chemical treatment, the potting components need to be stirred thoroughly, wet with formaldehyde or formalin @ 20ml/l and

kept covered with polythene sheet for at least 72 hours in bright sunlight. After opening, sun drying is required for few hours to evaporate the obnoxious gasses. It necessary sterlised media can be washed again.

Potting and Repotting

Potting of plants is usually done in sterilized growing media in accordance to size of plants. The most commonly used are earthen or plastic pots. The pots should have sufficient number of holes for aeration to root zone and draining out excess water. Repotting in cymbidiums is essential for at least two reasons- first is that media has decomposed and require a replacement and second is that plant has grown so big that the current pot size is no more enough to accommodate it. In general, cymbidium orchids respond positively if repotted every three years. Young plants respond more to frequent repotting. The best time to repot is just after flowering is over or when the new shoots and roots begin to appear. This will allow the plants the maximum possible time for re-establishment so that their flowering is subsequent year is not affected. While repotting the new pot size should just be enough to support growth for further 3 years. Over potting or repotting in too large a pot should be avoided. Old media is removed by shaking the roots. Holding the plants of its position the fresh media should be placed through the root and after filling the pot should be pressed firmly. Old pots require thorough cleaning for reuse, otherwise germs of diseases & pests will be there in the pots.

Propagation

Back-bulbs: Cymbidiums are sympodial orchids those have complete flowering and produced pseudobulb and back bulbs after reaching maturity serve the purpose of further multiplication. The back bulbs upon separation from mother plant produce new growth from certain growing points (called as eyes). Soaking in plain water, nutrient solution or growth regulator (Thiourea 5g/l or 6-BAP 1.5g/l) solution is beneficial for quick sprouting. After treating with growth regulator back bulbs can be planted in coco peat/saw dust and covered with transparent plastic sheet. The rooting media should be moist. An alternative to this method is placing the backbulbs in plastic bags. Either bag is sealed after blowing sufficient amount of air inside. Moist sphagnum moss can be used for wrapping the backbulbs or can kept at base to ensure minimum water loss from the bulbs.



Back bulb



Back bulb with shoot



Emergence of shoot and root

Dividing the pseudo bulbs: This method is applicable to the new growth arises from several growing points on rhizome. In fact it is necessary to divide a large overgrown specimen to maintain in manageable size. Best time for dividing is just before the one set of new growth (March to May) or immediately after flowering is over. There should be atleast 3-4 pseudo bulbs in each division. A piece of rhizome with few pseudo bulbs should cut off and potted separately in orchid potting mix. Normally the division should contain some back bulbs along when required and help the division to establish without much shock. While dividing, dead root should be cleaned to provide space for new roots.



Preparation of potting mixture

Treatment of root with fungicide



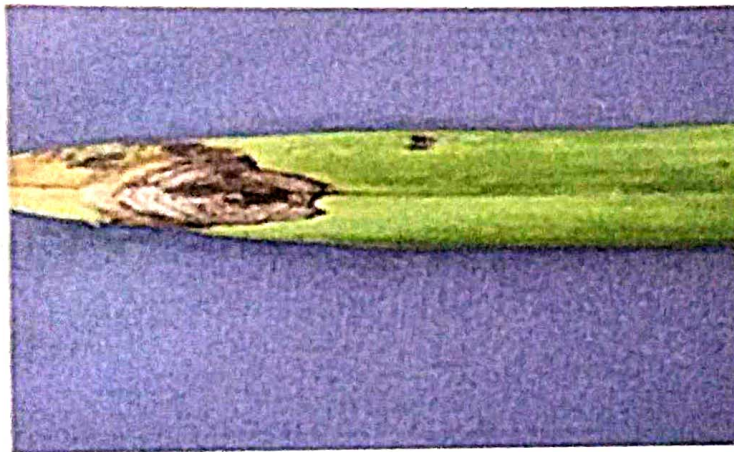
Division of Clump and cleaning of dead roots

Diseases and Pests management

Diseases : Major diseases of cymbidium are narrated below.

Anthracnose :

Initial symptom appears as the small oblong to circular oval, sunken and reddish brown to dark brown or gray coloured spots. Die back of leaves are also observed if the leaf tip is attacked. The disease also infects floral spikes and leaf sheaths



Anthracnose

Control measures : Maintenance of proper growing condition with adequate nutrition should be done. Spraying of Fixil @ 1g/l in case of incidence of the disease at 15 days intervals or application of *Trichoderma viridae* 2g/pot may be effective to control the disease.

Black rot:

The water soaked symptoms develops on the aerial parts of the plants that turn brown. The affected shoots can be pulled out with slight



Black rot symptoms

pressure and rotting portion gives out foul smell.

Control measures :

Diseased leaves, pseudobulb and if required whole plants should be removed and destroyed. The drenching of potting mixture with Metalyxyl @ 1.0 gm/l is useful. Organic fungicide Fixil @ 2 g/l at 15 days interval is also effective in controlling the disease.

Blossom blight/ Petal blight :

The most prominent symptoms are water soaked lesions and dense grey mold growing on infected tissues. It is the most common disease of orchid flowers. The disease first appears as numerous small dark spots on petals, especially on older flowers. Sometimes shot hole effect is found in infected flower petals. The fungus also causes top leaf blight when new young leaves start to emerge.

Control measures :

Proper sanitation is a sound cultural practice. Removal and destruction of diseased plant parts and old flowers from flower spike are also advised. Spraying with organic fungicide Fixil @ 1g/l 1 at 7 days intervals is effective.

Viral diseases

Cymbidium mosaic *virus* produces symptoms like mosaic, necrosis, chlorotic flecks, water soaked lesions and flower



Cymbidium mosaic virus

necrosis on *Cymbidium*.

Control measures :

Use of sterilized potting mixture. Use of sterilized garden tools and always sterilized with a mixture of 2% sodium hydroxide and 2% formalin solution for cutting of leaves and spike from each plant.

Pests : Major pests and control measures are as follows

Red spider mite:

These are minute sucking type insects which suck the sap from undersurface of newly emerged leaves and giving rise a silvery appearance. In case of severe infestation, plants covered with webbing as a result, pests can spread from one plant to another plant. Whole plants get weakened, growth stunted and loss of foliage occurs in the infected plants. Flower buds not open properly and flowers are usually abortive, turn brown and fall down before maturation.



Mite

Control measures :

Remove the infected plant part (leaves/flower) and destroy them to reduce the further multiplication of mite. Make clean cultivation, proper ventilation and should apply balanced fertilizers dose and irrigation to curtail the mite population.

Spraying of Neem oil 0.03 EC (Azadirachtin) 5 ml/l or Mycomite 1.5g/l or Imidochloprid 1ml/l at weekly interval will reduce the mite population.

Scales :

The scales stick on the under surface of leaves and suck the sap from leaves, petioles, pseudobulbs, flower and cause loss of vigor and deformation of infested plants. Heavy scale infestations, however, can reduce overall plant health and cause yellow leaves, leaf drop and stunted new growth.

Control measures :

Scales can be removed by rubbing the scurf encrustation with toothbrush or cotton swab dipped in 70% Isopropyl alcohol or spirit. Spraying with Neem oil 0.03 EC 5 ml/l at 15 days interval or spraying of Malathion @1m/l% or Endosulfan @1m/l at weekly interval are effective to control the insect.

Aphids :

These black and yellow coloured sucking insects accumulate on flowers and flower buds. They secrete honeydew on which shooty mould develops. The affected flower buds fail to either fail to open or open in deformed shape.



Black aphids

Control measures :

Initially spray the plants with tobacco leaf extract (10 ml/l) or Neem oil 0.03 EC (Azadirachtin) 5 ml/l of water to reduce the aphid population. Aphids can be controlled by spraying Imidochloprid 1ml/l at 15 days interval are effective to control the insect.

Mealybug :

Both young ones and adult suck the cell sap from the leaves and petioles or any jointed portion of plants as a result plants become weakened. In severe infestation sooty mould develops on infected plant parts. The attacked plant looks like wilted plant resulting poor quality of flowers production.

Control measures :

Removal and destruction of infested plant part and proper distance should be maintained within the plants to reduce the pest infestation. Spraying of insecticides like Malathion 50EC or Endosulfan 35 EC at 1m/l or Imidacloprid 17.8 SL @ 2ml/l or Neem oil 0.03 EC (Azadirachtin) 5 ml/l is effective to curtail the mealybug population.

Thrips :

Nymphs as well as by the adults suck the cell sap from tender portion of plant. Leaves of attacked plants become curled, wrinkled and discoloured.

Control measures :

Immediately remove the infected plant parts or whole plant (if

required) and destroy them to reduce the incidence. Spray the plant with Neem oil 0.03 EC 5ml/l of water or Malathion 50 EC or Imidacloprid 17.8SL (Confidor)@ 2ml/l. If required, repeat the spray at 10 days interval to control the insect.

Yield and harvesting

Cymbidium should be harvested at correct stage because it influences the keeping quality and yield for the next year. The spike should be harvested when all the flowers are open. While harvesting utmost care should be taken to see that pollen caps of the flowers remain intact. The spike needs to cut at the base of the stalk. The cut surface should be smooth and never crushed. A sharp knife or secateurs is required to sterilize time to time with antibiotic fungicide solution to avoid transmission of diseases.

Post-harvest operation

The harvested spikes need to dip immediately in bucket of water till they are packed. In order to improve the quality of flower spike and vase life, the cut spikes are given pulsing with sugar (2-4%).

Packing plays a major role in flower quality opening ability. Flower should be packed in green house to avoid risk of contamination. Usually the ambient temperature of packing sheds should be 12- 15°C, as such cool storage is not necessary. However if cool store is provided then temperature should be below 10°C, otherwise flower injury may occur.

Value Addition

Value addition in flower crops can directly or indirectly influence floral market to a great extent. Value addition in flower crops by employing technique like colouring in white flower, flower dehydration, flower processing, advance in flower arrangement etc can add value upto 5-10 times. Besides the decorative value orchids materials can be used in arts and decorative. *Cymbidium* species in China has been used as colouring agent. *Cymbidium* species like *iridiodes*, *munronianum* and *hookerianum* can be added in flower bouquet, vase to enhance beauty and natural fragrance to room.



Welcome to NAIP

The National Agricultural Innovative Project (NAIP) is to facilitate accelerated and sustainable transformation of Indian agriculture in support of poverty alleviation and income generation by collaborative development and application of agricultural innovation by the public research organizations in partnership with the farmer's groups, the private sector, the civil society organizations and other stakeholders.

Objectives

- Facilitation of methods of propagation and mass multiplication of quality planting materials of targeted aromatic plants (input supply).
- Refinement of cultivation practices of targeted aromatic crops under Sikkim conditions (Production).
- Exploration and fine-tuning of plant/location (altitude) specific post harvest management, value addition and residue utilization technologies of targeted plants to extend shelf life, retain quality and develop novel products etc. (post harvest management, processing and value addition).
- Conduct market research and create database for market intelligence and GI status to enable higher economic returns to concerned stake holders across the supply chain (marketing).
- Capacity building of primary and secondary stake holders through knowledge sharing, dissemination and demonstration, training and entrepreneurship development/promotion. (Collective action and use of ICTs).

