

THE ORCHID SOCIETY OF KARNATAKA

e- Newsletter  
**TOSKAR**



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## *From the Editor's desk*

One sometimes hears faintly dissatisfied murmurs about lengthy articles as many of our readers seem to prefer short crisp ones. By chance, this issue includes a number of short informative articles for your reading pleasure.

Sandya Mahesh's personal anecdote on how she so successfully nurtured and grew the Cymbidiums gifted to her by a former colleague; Anthea and Robin Roberts' brief on *Oncidium sphacelatum* are two such one pagers.

Adding to this list of short articles are Sriram Kumar's two brief ones on how to choose the appropriate shade net for your Orchidarium, and tips on care of the orchids during the monsoon. Both would prove to be of immense value for all, and especially for the novice orchid enthusiasts.

Sriran Kumar's beautifully illustrated write up on the Dendrobium beetle is also highly informative.

Ravee Bhat gives a fascinating account on the pollination mechanism of *Flickingeria nodosa*.

Suresh Kalyanpur's advice on growing *Dendrobium pendulum* is very helpful as many members of the orchid society enjoy growing these hardy and easy to care Dendrobiums available in a multitude of hues and sizes, sometimes at throw-away prices (a mere hundred bucks for a plant) too! Thanks to Orchid Tree for that bonanza. And for the 25% discount on some very nice hybrids so generously offered by Orchid Tree to all members of TOSKAR. Thank you Mamta and Regin for this wonderful gesture.

Srikanth Parthasarathy transports everyone to the far shores of California and gives us a glimpse of the small but beautiful orchid show adjudged by AOS (American Orchid Society) which he attended in Cupertino, CA, USA. He also takes us on a brief historical journey to the Himalayas, and his photographs of the orchids he saw both in Sikkim and Kalimpong are indeed a feast for our eyes.

Not to disappoint those who long to read some really scientific articles Dr Hegde's scholarly write up on the symbiotic relationship of the fungi and orchids, and how the mycorrhiza get associated is superiorly satisfying.

Dr Sastry as always brings us a bag of surprises. This time he delights us all Orcoholics with his engaging write up on Orchid Mania.

Fondly hoping that more and more TOSKAR members contribute to our Newsletter, thereby ensuring its timely release. Grateful thanks to all those who gave their time and sent their contributions for this issue.



## *In This Issue:*

**Orchids of Sikkim and Kalimpong – A Glimpse 4**

**Srikanth Parthasarathy**

**On Growing Cymbidiums from NE India in Bengaluru 32**

**Sandhya Mahesh**

**Observations on the Pollination of *Flickingeria nodosa* 33**

**Ravee Bhat**

***Dendrobium pendulum* – Culture and Care in Bengaluru 36**

**Suresh S. Kalyanpur**

**Know Your Enemy – The Dend-Beetle 39**

**K. Sriram Kumar**

***Oncidium sphacelatum* 42**

**Anthea and Robin Roberts**

**Orchid Care during Monsoon 43**

**K. Sriram Kumar**

**Orchids and Mycorrhiza: A Wonderful Symbiotic Relationship 44**

**Dr. Sadananda Hegde**

**Orchid Show at Cupertino, South Bay, CA 50**

**Srikanth Parthasarathy**

**Shade Cloth for Orchid Houses 56**

**K. Sriram Kumar**

**CRAZY WORLD OF ORCHIDS! 58**

**K. S. Shashidhar**

# Orchids of Sikkim and Kalimpong – A Glimpse

Srikanth Parthasarathy

## Introduction to Orchids

Orchids or The family Orchidaceae is one of the largest flowering plant families having more than 22,000 species in more than 800 genera. One can observe orchids growing everywhere on the planet except under extreme conditions of very high temperatures as in deserts and freezing temperatures as in Polar Regions. Every now and then new species are still being discovered. As recently as in early June 2015, BSI (Botanical Survey of India) announced the discovery of ten new species of orchids in the Sub-continent.

Orchids are mainly of two types based on their growing habitat. They are either epiphytic which means they grow on other trees or plants - the host plant merely provides physical support. The other type is terrestrial growing on humus rich soils.

## Vegetation

The largest Order of flowering plants in India is Orchidaceae. Orchids with their numerous habits are distributed throughout the country to suit the diverse habitats. But it is only in the Eastern Himalayas that the order predominates; in other parts of India Fabaceae (the pea family); Poaceae (rice and wheat and other grasses) and Euphorbiaceae (amla and rubber) outnumber the Orchids. In the flora of India there are ten genera with 100 or more species in each genus. Two such genera are orchids – *Dendrobium* Sw. with 116 species, and *Bulbophyllum* Thouars with 100 species. Majority of orchids in India are tropical epiphytes and quite a large number of them are endemic. However China, Australia and South Africa have more endemic genera and species than India.

## Introduction to Sikkim and Kalimpong

Sikkim is the smallest state of the Indian Union yet it surpasses other states of India in having maximum orchid diversity trailing just behind Arunachal Pradesh, which has the highest number of orchid species. But if the biodiversity ratio of orchid species to land mass is considered then Sikkim stands the highest perhaps even in the world. Arunachal Pradesh whose geographical area is more than eleven times that of Sikkim has only 620 orchid species and Bhutan whose geographical region is six times the size of Sikkim has only 372 orchid species as compared to Sikkim's 523.

**Kalimpong** is a multicultural society. History tells us that the original inhabitants of this region were the Lepcha tribals. However, the region being dominated by Sikkimese, Bhutanese and Nepalese kingdoms over time, the cultural and religious heritage of these kingdoms is very much

evident even today. Hill terracing, a typical influence of Nepalese agriculturists is seen everywhere.

The area around Kalimpong lies in the Eastern Himalayas, which is classified as an ecological hotspot, one of only three among the ecoregions of India. Neora Valley National Park is situated in the Kalimpong subdivision under Darjeeling District, West Bengal, India and was established in 1986. It spreads over an area of 88 km<sup>2</sup> and is one of the richest biological zones in the entire Northeast. It is the land of the elegant Red Panda in the pristine undisturbed natural habitat with rugged inaccessible hilly terrain and rich diverse flora and fauna making this park an important wilderness zone. Seven species of rhododendrons are found in the region east of Kalimpong. The temperate deciduous forests include oak, birch, maple and alder. Three hundred species of orchids are found around Kalimpong, and orchid production and export constitutes a major industry here as they are exported to many parts of the world. Poinsettia and sunflower are some of the wild species that line the roads of Kalimpong.

### **Characteristics of the flora in the Himalayan Region**

The Himalayas, its foothills in the northeastern states form a chain of mountains about 5000 km long. These mountains insulate Northern India from the rest of Asia. Climate of this region with innumerable peaks is extremely varied due importantly to variations in altitude. Below 600 m in the lower valleys of the Himalayas the areas have a hot and moist tropical climate. Higher up around 2000 m it gets cooler to a temperate climate. Beyond this up to 3000 m it is cool temperate, the temperature decreasing further up to the snowline.

The vegetation here comprises of pine, deodar, birch, and rhododendrons which are not found anywhere else in India. The broad-leaved wet forests occur in the lower elevation up to 900 m. The middle and upper montane evergreen forests succeed this. Beyond this between 2000\3000 m occur the Quercus\Rhododendron and higher up occur the Betula\Juniperus formations. At further higher elevations up to 6000 m occur the prostrate plants, grasses and sedges.

The Himalayan region is the meeting point of several countries and so also their flora. There are many Malesian, Chinese and Indo-Chinese elements in the tropical and subtropical forests of this region. A total of 1023 taxa in 167 genera have been recorded from this region. 868 taxa and 79 genera of these are found exclusively in the Himalayan region. 107 taxa of this region are common with the orchid flora of the peninsula while 20 taxa are found in the Andaman and Nicobar Islands; 30 taxa are to be seen both in peninsula and the Himalayas. In terms of number of species and genera this region has the richest orchid flora in India. Arunachal Pradesh has the largest number of orchids in India followed by Sikkim. However there are only 195 endemic species in this region being about 22.3% of the total endemic orchids of India.

The number of genera and species in the Himalayan region is very high as this is the meeting point of several phytogeographical regions. Conversely the endemic elements are lowest in this region. The endemic and sub-endemic genera discussed earlier show strong altitudinal preference between 300\4500 m.

## Places visited during the field trip

During the field trip, a number of places were visited in Sikkim and in and around Kalimpong during 2<sup>nd</sup> and 3<sup>rd</sup> weeks of May. First visit was towards some of the interesting places around Gangtok, from monasteries to orchid gardens to Changu lake (Tsongmo lake) to the high altitudes of Nathula Pass (4310 m). There were beautiful blooms of several species of Rhododendrons all along the way up to Nathula pass; and beautiful Primulas around the lakes at the altitudes of 3500 m to 4000 m. On the way to Ranka Monastery, there was a tree full of beautiful white flowers. And those were actually the flowers of *Coelogyne nitida* (Wall. ex D. Don) Lindl. That gave a good start for the trip.

The next visit was towards the south to the beautiful town of Kalimpong. Stationed at *Holumba Heaven* in Kalimpong for 5 days, it was a real good base to travel around Kalimpong. Through some known contacts we got to know people at *Holumba* well and also a guide to help identify the species. The guide, fondly called as '*Master Ji*' was a knowledge bank of Orchids and we enjoyed his company for the rest of the days at Kalimpong. Around 250 species of orchids were sighted in four days in and around Kalimpong; visited many places at various altitude levels like Neora Valley National Park, Lava, Up and down the Relli River, Darjeeling etc.

This write up is classified based on the species sighted at various altitude levels. The below table gives an altitude-wise breakup of the 25 orchid species in bloom.

SI No	Altitude	Orchid Species
1	300 m to 1000 m	<i>Panesia uniflora</i> , <i>Dendrobium anceps</i> , <i>Tylostylis discolor</i> , <i>Arundina graminifolia</i> , <i>Cymbidium aloifolium</i> , <i>Phalaenopsis mannii</i> , <i>Aerides multiflorum</i> , <i>Aerides multiflorum var. alba</i> , <i>Ascocentrum ampullaceum</i> , <i>Phaius tankerville</i>
2	1000 m to 2000 m	<i>Coelogyne corymbosa</i> , <i>Coelogyne cristata</i> , <i>Coelogyne flavida</i> , <i>Coelogyne ochracea</i> , <i>Pholidota imbricata</i> , <i>Dendrobium densiflorum</i> , <i>Dendrobium fimbriatum</i> , <i>Dendrobium amoenum</i> , <i>Dendrobium nobile</i> , <i>Vanda cristata</i> , <i>Rhyncostylis retusa</i>
3	2000 m to 3500 m	<i>Cremastra appendiculata</i> , <i>Tainia minor</i> , <i>Calanthe chloroleuca</i> , <i>Calanthe brevicornu</i> , <i>Coelogyne ochracea</i>

***Aerides multiflorum* Roxb.**

Flowering time: April and May.

Distribution: Commonly found at the base of Darjeeling, Sikkim Himalayas and distributed to Meghalaya.



v. alba Hort. A rare white-flowered form devoid of purple pigmentation on the leaves.



***Arundina graminifolia* (D.Don) Hochr.**

Flowering time: April\September;

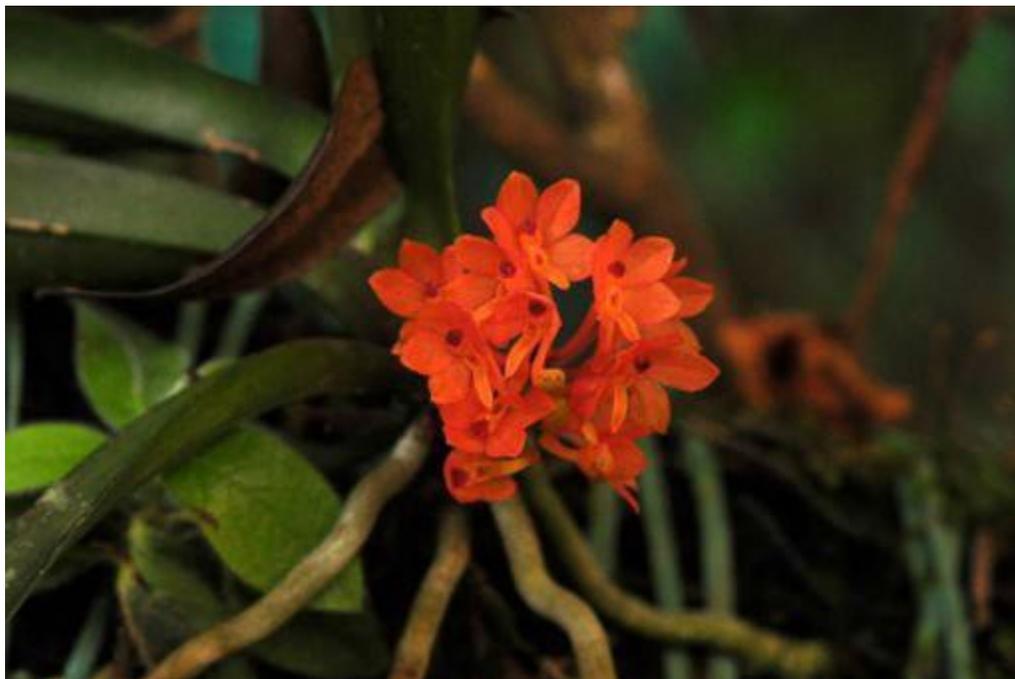
Distribution: Throughout India and other parts of South\Eastern Asia



***Ascocentrum ampullaceum* Lindl. ex Wall.**

Flowering time: March\April.

Distribution: Found in Sikkim, Nepal, Darjeeling, Bhutan, Khasia Hills and Bangladesh at 300\1000 m and distributed to Burma and Thailand.



***Cymbidium aloifolium* (L.) Sw.**

Flowering time: April\May.

Distribution: Found throughout Northern and Southern India and distributed to Malasiya and Indochina.



***Dendrobium anceps* Sw.**

Flowering time: April\May.

Distribution: Found at 300\600 m in Sikkim, Darjeeling, Nepal, Andaman & Nicobar Islands and extending to Burma and Thailand.



***Panisea uniflora* (Lindl.) Lindl.**

Flowering time: April\May.

Distribution: Found in Sikkim, Darjeeling, Bhutan, Nepal and Khasia Hills at 250\1500 m, and extending further to Burma.



***Phaius tankervilleae* (Banks) Blume. K Nun orchid**

Flowering time: April\May

Distribution: native of Fujian, Guangdong, Guangxi, Hainan, Xizang and Yunnan provinces of China, Hong Kong, Taiwan, the Pacific Islands, Malaysia and Indonesia at elevations up to 1300 meters in lower montane woods and in grasslands in moist depressions with black soil



***Phalaenopsis mannii* Rchb. F.**

Flowering time: May.

Distribution: Found in Darjeeling, Sikkim and Meghalaya at about 500 m.



***Tylostylis discolor* Hook f.**

Flowering time: February

Distribution: Found in Sikkim and Khasia Hills at 200\1200 m.



***Coelogyne corymbosa* Lindl.**

Flowering time April\May

Distribution: Found in Sikkim, Darjeeling, Bhutan and Khasia hills at 2000 – 2800 m.



***Coelogyne cristata* Lindl.**

Flowering time: March\ April.

Distribution: Eastwards from Kumaon through Nepal, Sikkim, Darjeeling, Bhutan to Khasia hills at 1600 – 2600 m.



***Coelogyne flavida* Wall. Ex Lindl.**

Flowering time: May – August.

Distribution: Found in Nepal, Sikkim, Darjeeling, Manipur, Naga hills from the elevations of 1500\1700 m extending further to Burma and Thailand.



***Coelogyne nitida* (Wall. ex D. Don) Lindl.**

Flowering time: Spring time

Distribution: Found in Nepal, Bhutan, upper Myanmar, NE India, Bangladesh, China (Yunnan), Thailand and Laos on trees and mossy rocks at elevations of 1300 to 2600 meters.



***Dendrobium amoenum* Wall. ex Lindl.**

Flowering time: June.

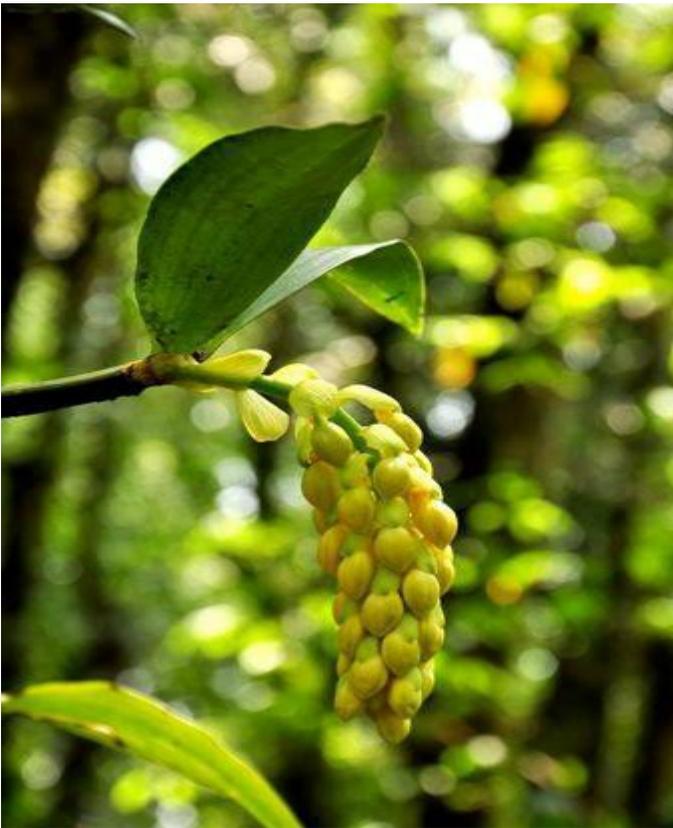
Distribution: Found in Gharwal, Nepal, Sikkim, Darjeeling, Bhutan, and Meghalaya at 500\1300 m. Extends further to Burma.



***Dendrobium densiflorum* Lindl. ex Wall.**

Flowering time: April –May

Distribution: Found in Sikkim, Darjeeling, Nepal, Bhutan, Khasia Hills, Burma, Thailand at 800\1500m.



***Dendrobium fimbriatum* Lindl V. *Oculata* Hook. F.**

Flowering time: April\May.

Distribution: Found in Kumaon, Nepal, Sikkim, Darjeeling, Bhutan, and Khasia Hills at 1000\1500 m and extending further to Burma and Thailand.



***Dendrobium nobie* Lindl.**

Flowering time: April

Distribution: Found in Nepal, Sikkim, Darjeeling, Bhutan and Khasia hills at 1300\1700 m and distributed eastwards to Burma, Thailand and S. China.



***Pholidota imbricata* Lindl.**

Flowering time: May\august.

Distribution: Found in whole of southern and northeren india an distributed eastwards via S E Asia to China to Australia



***Rhyncostylis retusa* Wall.**

Flowering time: June.

Distribution: Found throughout Northern and Southern India at 800\1500 m and distributed to S. E. Asia.



***Vanda cristata* Lindl.**

Flowering time: April\May.

Distribution: Found in Kumaon, Nepal, Sikkim, Bhutan and Meghalaya at 1700\2000m.



***Cremastra appendiculata* (D. Don) Makino**

Flowering time: March\April.

Distribution: Found in Nepal, Sikkim, Bhutan and Khasia Hills at 2000\2600 m and distributed further to Japan.



***Calanthe brevicornu* Lindl.**

Flowering time: May\June.

Distribution: Nepal, Sikkim and Bhutan at elevations of 2000\2700 m.



***Calanthe chloroleuca* Lindl.**

Flowering time: April\May.

Distribution: Endemic to Sikkim at 2000 – 2500 m.



***Tainia minor* Hook. F.**

Flowering time: June to July.

Distribution: Found in Sikkim, Bhutan and Darjeeling at an elevation of 2000 m.



**References:**

1. Orchids of India by Sarat Misra
2. Indian Orchids: Guide I and II by Udai C. Pradhan
3. The Orchids of the Sikkim\Himalaya by G. King and R. Pantling (During the field trip)

## On Growing Cymbidiums from NE India in Bengaluru

Sandhya Mahesh

About 5-6 Cymbidium plants were given to me by an acquaintance from North East India when she returned from her annual holiday, two years back. She had somehow got to know I collect orchids, hence this was her thoughtful gift. Instead of feeling elated I must admit I was indeed disappointed. I might sound rude or ungrateful, but the reason was, everyone who had grown NE Cymbidiums earlier had the same thing to say: “forget it, it won't flower in B'lore, we've had NE Cymbidiums for years without any result.”

Anyway, since this lady so sweetly brought me the plants all the way from her hometown in the NE, I took care to grow them to the best of my ability. I tried to give a similar environment from where the plants came (the best possible way I could).

I kept the plants in a corner of my back lawn under the shade of a tree, where the direct sunlight doesn't fall on that area except in the summer months, as that spot was protected by a high wall. During summer I shifted to a shadier spot.

Watering used to be like twice a week in winter, but the lawn around the pot is well drenched daily, and during rainy season I would spray a fungicide and once in a while I have sprayed NPK though not regularly.

When it put out a new growth, at first I thought it was another new shoot but when I realized it was actually a flower bud my happiness knew no bounds. I think the chilly winter (Nov-Jan) has helped it to start the bud, so also my keeping the area cold and wet with watering around the pot regularly. Anyway I had a rather long wait because the bud took nearly two months to bloom.

The wait was indeed worthwhile. The beautiful blooms finally opened in the 1st week of March. That was the most exciting moment for me. We've had the pleasure of enjoying the blooms for over a month and now the flowers have started to wither.

But one thing I must tell you, after it flowered, I kept the flowering pot indoors where it was cool and at night I kept it in my bedroom, because the AC was on and I thought it will help the flowers last longer. It was literally like having a baby in the house. So dear friends! Don't lose heart if you have Cymbidiums from NE. They will acclimatize and someday give you immense pleasure with their beautiful blossoms.

Please see the cover of this issue for my photo of *Cymbidium*.

## Observations on the Pollination of *Flickingeria nodosa*

Ravee Bhat

*Flickingeria nodosa* (Dalzell) Seidenf. – now a synonym of *Dendrobium nodosum* Dalzell is an epiphytic species of Orchidaceae family found commonly in forests of Southern Western Ghats. It is seen growing in semi-deciduous forests in upper Ghats in Karnataka state quite commonly on *Terminalia* trees.

*Flickingeria nodosa* exhibits a rather unique appearance when compared to the other epiphytic orchids in the Western Ghats. It occurs in large colonies on tree trunks growing as a tuft of rhizomatous spread on the host branch with a 3-4 noded-pseudo bulb that bears a single thick, coriaceous leaf. This makes it easy to identify even when it is not in flower. The mildly scented flowers are white with maroon dots; they are solitary and short lived. It is seen that flowers are open only for a few hours in the mornings. By noon they start closing, and wither away as the day progresses. When in bloom the plant would have many solitary flowers on a number of pseudo bulbs. And they flower periodically, perhaps due to certain climatic changes.

Within this short period of time this mildly fragrant blossom attracts potential pollinators. Following are the observations of pollination of a flower under cultivation conditions away from the natural habitat of the plant by a hymenopteran insect (identification yet to be ascertained). It is noticed as the insect enters the flowers the lip moves in a vertical direction so as to provide an obstruction free passage. Once the insect closes in on the pollinaria (pollen grains in Orchidaceae are grouped into special units called pollinea - such pollinea along with accessory structures for attachment to the pollinator are the pollinaria), the lip of the flower moves in again to close and regains the original position. Now it has no weight of the insect on it. This mechanical movement seems to facilitate the pollinator to enter the flower freely and hence enabling successful pollination. In this process the insect is perhaps pressed against the pollenia so that the pollen get attached to the back of the insect; and when it moves to another flower the pollination process is completed via a similar movement.

Thus fertilized flower grows into a capsule (seed-pod). It takes around 50 days for the capsule to mature and seeds to disperse. It is noticed that at around the 48<sup>th</sup> day the capsule starts turning yellow and by the 50<sup>th</sup> day it breaks open to disperse the seeds.

This was observed in the month of July 2014

A few pictures of the flower with the pollinator are attached below,



Insect with pollen





Inset entering flower



Insect on the lip

## *Dendrobium pendulum*

Suresh S.Kalyanpur

Dendrobiums grow in a large stretch of area in Asia, from the eastern foothills of the Himalayas south into India, the Indo-China peninsula, Malaysia, Indonesia, New Guinea and Australia. There are about 1,000 species in this belt, so it isn't possible to classify or generalize about their cultural requirements. While some grow in areas that are warm all year long, others grow in cool cloud-forests. Some thrive in conditions that are generally moist all or most of the year, some have adapted to seasonal wet/dry cycles.

*Dendrobium pendulum* (earlier known as *Dendrobium crassinode*) is one of those plants that is not seen in most collections as compared to popular species like *parishii* and *primulinum*. A hardy and relatively easy to grow species, the Pendulum produces growth in late December to early February, which will mature by August to September. What distinguishes this plant from the others in this genera is the unusual cane whose nodes resemble lumps or knobs.

*Dendrobium pendulum*'s fragrant flowers measuring about two inches across are produced at the nodes, in groups of 1 to 3 and last for up to three or more weeks. The colour of the bloom is crystal white tipped in dark pink with a bright yellow throated lip that may have two maroon eye like disks.

This orchid grows on tree trunks as a small to large sized plant. It likes hot to warm growing conditions and can be classified as an epiphyte or sometimes when it grown on rocks as a lithophyte. It thrives in full sun at elevations of 760 to 1600 meters. The canes appear as tufted masses, are decurved or pendulous, with 8 to 14 swollen nodes, dull olive-green in colour, carrying deciduous leaves. The blooms are axillary growing on short shoots from the upper nodes on new leafed and also old leafless canes. The fragrant and long-lasting flowers are produced during the Fall through Spring but mostly in late winter and early spring.

**Cultural requirements:** Fortunately, most popular species in the group have similar cultural requirements. They grow robustly during spring and summer; growth stops altogether in late fall, and the plants may drop their leaves during the winter resting period.

**Temperature.** In their native habitat, these orchids experience mild to warm daytime temperatures in spring and summer, and generally cooler temperatures in the winter. For most, the winter night temperatures range from about 12°C to about 18°C. These plants will do well for us in Bangalore with our normal winter night temperatures, which are usually in the range of 15 to 18°C.

**Light.** Provide the plants plenty of bright but filtered light during active growth period. Most of these Dendrobiums grow attached to deciduous trees, so they want higher light in winter. Grow them under Cattleya light levels during the growing season, and move them to Vanda light levels during their resting period.

**Water.** This may be the most crucial element to success with these orchids. Their native conditions are fairly wet during late spring, summer and early fall. Rainfall is quite heavy for a few months, but it tapers off in late fall, and winter months are fairly dry.

Water the plants regularly when they are actively growing. Mounted plants can be watered daily if air circulation is good.

Remember to reduce water from Fall until mid-winter but do not let the plant become too dry. Occasional misting and light watering once a fortnight may be followed until new growths appear in the spring

Observe the tips of the canes in the fall, they will stop producing new leaves. This is the signal that the plant has finished growing for the season; gradually reduce watering, and allow the plant to dry somewhat between waterings. There is some moisture in the habitat at this time, so the plants do get a little water from dew or fog; a light watering every few days is all they need. Growth will start again in late winter or early spring at about the same time that the flower buds begin to form; once the buds have formed, and new growth appears, increase watering again.

**Fertilizer.** These Dendrobiums benefit from regular feeding when they're actively growing. Any balanced, water-soluble fertilizer can be used, the 20-20-20 is a good option. Reduce feeding in the fall and eliminate it completely when the plants are resting in the winter. Resume feeding after the flowers have dropped.

Fertilizer may be curtailed or greatly reduced through this rest period.

**Potting.** This orchid is best grown mounted or in hanging baskets. This large species can grow to great sizes, so if mounted, the mount material should be sturdy – a cork slab or dense tree fern plaque works well. Mounted plants can be watered daily in summer if the air circulation is good. In a basket, use a very well-drained epiphyte mix. I prefer to mount them or grow them in wire baskets or netted cones.

**Problems.** These Dendrobiums have very few really major pest problems. Snails and slugs may damage the leaves and canes, and occasionally during wet weather you may see some minor damage from leaf-spotting fungal diseases. A fortnightly anti-fungal bath is recommended.



Striking swollen nodes of pseudobulb of *Dendrobium crassinode* Roxb. Pic credit: K.S. Shashidhar



*Dendrobium pendulum* flowers Roxb. Pic credit: K.S. Shashidhar

## Know Your Enemy – The Dend-Beetle

K. Sriram Kumar

### Introduction

- One of the Most Destructive pests of orchids
- Originally from Australia but has spread to Thailand and now seen in North East India, West Bengal, Kerala & Bangalore
- It is a chewing insect & mainly attacks Dendrobium, Vandaceous, Cymbidium & some terrestrial orchids (Spathoglottis)
- Lifecycle lasts 2-3 months and its peak activity is in Summer
- Produces a foul smelling secretion and hence distasteful to birds
- Potential carrier of orchid virus



Adult beetle on a flower

## Lifecycle – 2-3 Months

Stage	Damage	Identification & Symptoms
Adult (60-70 Days)	Feeds on leaves, flowers, buds & seedpod and can destroy all buds in no time.	Brightly colored (Yellow, orange with or without black band/dot) Adult beetles cannot fly but younger ones can fly, if they feel threatened they curl up and fall on the ground.  At the onset of attack, orchid leaves appear to be skeletonized
Eggs (10 days)	Adult lays eggs on new growths, buds and flowers. Eggs are tiny and are greenish in color	
Larvae (5 Days)	After about 10 days, the larvae will emerge and would tunnel into new shoots causing them to be soggy and rot Larvae would grow to 8-10 mm and then will bore through the canes of dendrobium and eat out the soft internal tissue in the dendrobium canes	New shoots are soggy and significant damage to leaves  Cross section of canes shows significant damage and is almost hollow  Holes in canes of dendrobium and sudden rot of the cane
Pupa (21 days)	Larvae pupate in a mass of white, waxy material and usually found in the base of the leaves	White foam/tooth paste like mass on the leaf axils or on the leaves

## Control

Chemical	Systemic treatment (imidacloprid) to cover all stages of life cycle (Repeat at an interval of 2 weeks till complete control)  Imidacloprid 2ml/Liter (confidor) Carbaryl 1gm/Liter
IPM	Weaver Ants (Native of Indonesia). Not available in India
Organic	<ul style="list-style-type: none"> <li>• Manual catching &amp; squashing of adult and pupa</li> <li>• Neem oil (2ml to Liter) covers only the adult stage of the life cycle</li> <li>• Drenching the plant and medium with a weak solution made from spent coffee grounds. As an added benefit, This also deters snails in the medium (1 part coffee ground to 10 parts water)</li> <li>• Drenching the plant with a specific Chinese tea (Lapsang souchong) seems to deter this pest</li> </ul>



**Pupa and Larval stage**



**Attacked Flower**



**Pupa**

Photo Courtesy: Utpal Bordoloi, Saleem Mohamed, Mathew Jose Mathew, Nilotpal Sarkar  
(Indian Orchid Growers Association FB Group)

## *Oncidium sphacelatum*

**Anthea and Robin Roberts**

We bought this orchid from Orchid Tree, Thippasandra Main Road in November, 2014.

At the time there were just three flower stalks of about two-three feet long. Over the next three months there were five stalks with the longest reaching 5'ft 6" in length.

By January 2015 these flower stalks began forming lateral flowering shoots.

Soon the plant was covered from head to toe with small yellow and purplish brown flowers which you could not possibly count.

Daily in the morning the orchid pot (medium), the few exposed roots, and the leaves were sprayed with 50:50 aquaguard water and Cauvery tap water. Just as we do for all our other orchids. Each week usually at the weekend the spray bottle was made up with a weak fertilizer (high bloom 1/2 tsp) for a foliar spray and root feed.

It continued flowering for the best part of two months or more before the flowers began fading and dropping. When the flowering was over we cut the flower stocks down to an inch from the base as advised by Orchid Tree. We have now put it away in a cool area on our balcony.

And looking forward to the next flush of flowers! Hopefully we will be as lucky the second and more times.



## Orchid Care during Monsoon

K. Sriram Kumar

1. Rainwater is best for orchids and allowing the healthy plants to enjoy showers of rain is best that you could offer to them. Showers of rain help in flushing the pot and media of any chemical salts that would have accumulated.
2. Collect & store rain water to extent possible and use it for orchids. Keep them in closed containers to avoid contamination and mosquito infestation.
3. Too much of anything could be bad. It is important to allow orchids to dry well after exposing them to rains. Closely inspect crown of Phalaenopsis, Paphiopedilums and Vandaceous orchids, potting media after rains. If stagnant water is found in the crown, use a straw to blow the water of the crown and if it is found in the potting media, drain it immediately.
4. Snails and slugs become very active during monsoon and it is important to keep a control on the activity. Use the following techniques
  1. Make a mixture of spent coffee grounds and water (1:10) and drench the potting media and grow area (if growing outdoors). Slugs and snails hate caffeine
  2. Spread a few leaves of lettuce on the pots/grow area and leave them on the pots overnight and collect the leaves with slug/snails in the morning and destroy them.
5. If you happen to have a few strips of copper wire (recycle from any old wire or transformer), then tie them in the base of some of the plants so that slugs and snails can't climb on them. Slugs and snails hate copper.
6. Use a chemical bait (Metaldehyde or iron phosphate) to kill the slugs and snails.
7. Fungal and bacterial infections are at their peak during the rainy season. Adopt following strategy to control them
  1. Closely monitor leaves and roots for early warning signs of rot.
  2. If required, spray a prophylactic contact fungicide (mancozeb) next day after rain. Give a gap of 5-6 weeks before spraying again
  3. If your orchid is infected, Isolate it and treat it with a systemic fungicide (thiophanate methyl) or a bactericide (Streptomycin + Tetracycline).
8. If you are growing orchids outdoors, avoid fertilizing orchids on a rainy day

Quoting Dr. Martin Motes “an ounce of prevention is worthier than a pound of healing”.

Note: Use appropriate care in using chemical fungicides and bactericides, as excessive use is harmful to you and the environment.

## Orchids and Mycorrhiza: A Wonderful Symbiotic Relationship

**Dr. Sadananda Hegde**

E-mail: [sadanandnhegde@gmail.com](mailto:sadanandnhegde@gmail.com).

Orchids have won the hearts of man for their lovely blooms with amazing colour combinations, curious shapes, long lasting flower qualities; diverse habits (Saprophyte, Terrestrial, and Epiphytes/Lithophytes) and habitats; wide distribution world over; besides their medicinal and aromatic usages. Today, orchids command commercial importance in the world with multimillion dollar business in floriculture. When one peeps into the biology of orchids, they have the distinction of being one of the most highly evolved groups of flowering plants with variously modified stems, roots and flowers, to withstand the adverse climatic situations to achieve survival and proliferation. They exhibit an amazing mechanism of pollination, fertilization, seed formation and dispersal. The resupinate flowers – the flower stalk (pedicel) and ovary undergo a 180-degree twisting while developing so as to bring the naturally bottom of the flower to the top – are highly modified too. The combined male & female parts form a column having stigma with a sticky surface to receive the variously modified pollinial apparatus separated by a thin membrane; one of the petals is variously modified to form a labellum or lip with spur, lobes, callus, hairs, nectar, aroma, mentum, etc. and adopts deceptive mechanisms to attract or trap insects to effect pollination, formation of a number of minute (microscopic), undifferentiated naked seeds (only a tiny mass of cells without endosperm or food reserves) to achieve dispersal (Hegde 1984). Once the dispersed seeds fall on a suitable substratum (moss, tree trunk, rock or soil) under favourable conditions (moisture, temperature and light) they germinate. It is at this point of time, the emerging roots of the germinating seed get infected or in other words, get associated with a specific fungus or mycorrhiza and this is called “Mycorrhizal Association”. Such an association is also called “**Symbiotic Relationship**” as the infected fungus becomes a life partner of the orchid meeting the food/energy (carbon) needs of the host orchid (Singh & Hegde 1999). This relationship is retained by most of the orchid species throughout their life. See Figs. 1 – 12\*.

## Habit of Orchids (Figs 1 – 4)

**Fig.1.** Saprophytes: grow on decaying organic matter, non chlorophyllous. **Fig. 2.** Terrestrial: grow in soil, leaves having chlorophyll, **Fig. 3.** Epiphytes: grow on trees/rocks, with chlorophyllous leaves. **Fig. 4.** An epiphytic orchid (*Vanda*) growing on a tree trunk. Note the cluster of hanging aerial roots.



1

2

3

4

**Figs. 5 & 6: A Typical Orchid Flower:**

**Fig.5.** Front view of Orchid flower showing Column at the centre; Lip at bottom centre; lateral sepals on either side of lip; top centre dorsal sepal with lateral petals on either side.

**Fig.6.** Side view of flower showing Pedicel-ovary on which flower parts are attached and the mentum behind the lip and the column.



5



6

**Figs. 7 – 9: Fig. 7. Flower Parts Dissected:** At the centre - resupinated pedicel ovary with column & foot to form mentum; Lip at bottom; lateral sepals on either side of lip; top centre dorsal sepal with lateral petals on either side; **Fig. 8. Pollination through deceptive mechanism.** Note the insect pollinator sitting on the lip of orchid and inserting the proboscis to suck nectar. **Fig.9. Seed pod with dust like seeds** (Inset: Single seed enlarged).



7

8

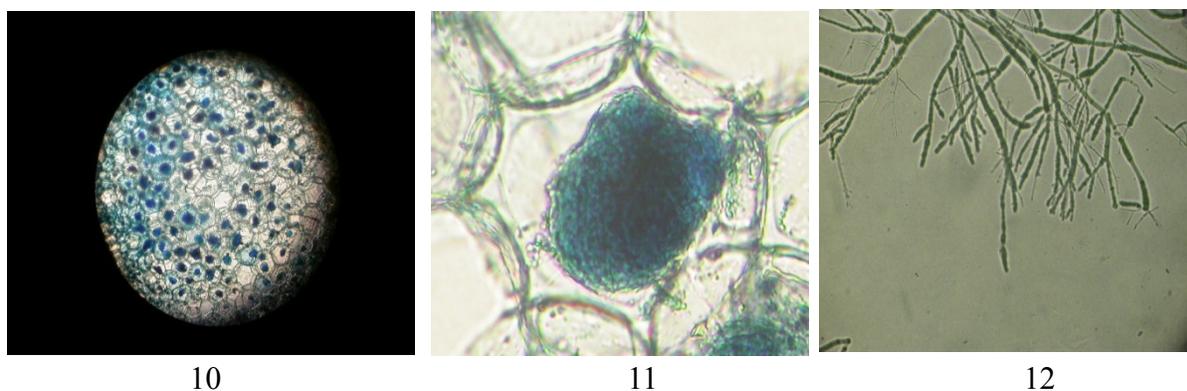
9

**Seed formation and Dispersal:** Once the pollination is effected by a specific vector (insects), the flower shrivels; sepals & petals arch over covering stigmatic surface indicating successful fertilization. Over a period of few days to about 10 months depending upon the species, ovules mature into seeds – the number of which varies from hundreds to millions per pod (Fig. 9). Mature pods burst open along the suture as they dry with a triggering effect throwing out minute dust like seeds which are carried away by the wind to fall on a substratum, thus achieving dispersal in a skilled manner (Hegde 1984).

**Seed Germination:** Orchid seeds are very minute and dust-like and are produced in large numbers. They are non endospermic (without food reserve) comprising a small mass of undifferentiated embryo within a transparent (occasionally pigmented) seed coat and are found in various shapes and sizes depending upon the genera & species. Under favourable conditions with proper humidity, the seed begins absorbing moisture/water from the substratum where it has fallen due to dispersal. Simultaneously, mycorrhizal activity also begins in that congenial atmosphere. Germination of the orchid seed in nature depends upon colonization of the specific Mycorrhizal fungus. The mycorrhiza penetrates the seed coat/testa and enters through the epidermal hair or suspensor of the undifferentiated embryo. Once it succeeds entering into the cell membrane of undifferentiated embryo, it colonizes the plasma membrane and forms a coil which is called 'peleton' in the cell (see figs. 10 –12). The fungal colonization continues

spreading from cell to cell forming peletons and then collapses. With the initiation of fungal colonization followed by meristematic activity of the embryonic cells, germination begins forming a small dome shaped Protocorm with 1 or 2 roots at the base, thus differentiating into a plantlet. With the initial contact between the fungus and the seed, there are three possibilities: 1. the seed and the mycorrhiza form a lasting mutual functional relationship; 2. the fungus may cause infection or parasitize the seed inhibiting germination; 3. the fungus remains outside the seed promoting germination & growth.

**Figs. 10 - 12: Cross section of orchid root (Under microscope):** Figs. Left to right: 10. Cells infected with mycorrhiza. 11. Single cell colonized with mycorrhiza forming peleton. 12. Mycorrhizal hyphae (mycelium).



While the mycorrhizal activity is confined to the basal region of the germinating seed, the process of differentiation and growth continues at the apical region of the protocorm.

**Orchid Mycorrhiza:** Mycorrhizal fungi are an important component of soil atmosphere and soil chemistry. They establish a mutualistic (occasionally pathogenic) relationship with the root system (Rhizosphere) of vascular plants by converting and supplying micro nutrients to plants (Hadley 1982, Singh & Hegde 1999). There are different types of Mycorrhiza – essentially, Arbuscular mycorrhiza, Ecto-mycorrhiza, Ericoid mycorrhiza, Arbutoid mycorrhiza, Monotropoid mycorrhiza and Orchid mycorrhiza.

All orchids are mycoheterotrophic at one stage in their life cycle and form Orchid mycorrhiza (Rasmussen 2002). They are distinctive which form a coil of hyphae or peletons inside the cell of the plant and help in germination of the seed which is not so in other types of fungi (Hadley 1982, Rajkumar & Kaushik 2007, Katiyar et al 1986, Murugan et al 2010, Vij & Sharma 1983). These are mutualistic, in that orchids gain in intake of nutrients required for germination and growth and provide assured habitat to the fungus inside the root cells. According to Rasmussen (2002), orchids are essentially mycoheterotrophic during their seedling stage as source of carbohydrate (sugar/sucrose) which may get extended to adult plants in many orchids. Taxonomically, these fungi are grouped under various categories under Basidiomycetes.

It has been shown that the species of *Rhizoctonia*, a fungal genus known to be parasitic, is associated with Orchid-fungus symbiosis from seed to plantlet formation and help in the breakdown and conversion of complex lignin into simple carbohydrates as source of energy to the germinating seeds (Rajkumar & Kaushik 2007). Initially, Orchid mycorrhiza present in the substratum facilitates breakdown of debris of substratum and transport nutrients and minerals from outside into the cells of orchid roots through its hyphae and gradually colonizes the cells forming a peleton which further facilitates in the breakdown of complex carbohydrates into simpler forms as a source of energy required for the growth and differentiation of orchid plant, thus acting both as Ecto- and Endo-mycorrhiza. Although orchid is benefitted with this kind of association in the intake of nutrients and minerals for its sustenance, the extent of gain by the fungus/mycorrhiza is however not very clear and requires further investigation.

It is worthy to note that the aseptically cultured orchids and hybrids do not have mycorrhizal association as they are laboratory grown and therefore require supplementation of nutrition from time to time. Experiments have now been carried out to induct specific mycorrhiza to such lab-origin orchids at the hardening stage so as to reduce the cost of application of fertilizers to them.

It is interesting to note that chlorophyllous (leafy) orchids control the colonization of Mycorrhiza at some stage, as they are capable of synthesizing their own food in the chloroplasts and probably to control the pathogenic effect of the fungus if any. Orchid Mycorrhiza is confined to the roots which are in contact with the substratum. In fact, interaction between the fungus and orchid is regulated through the seasons of active growth and dormancy of the orchids. Shedding of leaves during dormancy is one such mechanism to control colonization of Mycorrhizal fungus (Murugan et al 2010). However, the fact that the moment dormancy breaks, presence of mycorrhiza is seen in the roots and this suggests that orchids have special qualities of attraction for the mycorrhiza. While insects are attracted by the flowers for pollination with its deceptive mechanisms and modifications, setting the process of fertilization and seed formation, the source and mechanism of attraction in the roots of orchids for initiating germination of seeds and the subsequent reappearance of symbiotic partner after dormancy period of orchids is yet to be understood.

Thus, the symbiotic relationship of Orchids and the Mycorrhizal fungi is amazing and is a biological wonder depicting the delicate balance of nature, so beautifully woven. At the same time, this also indicates ecological significance, in that any disturbance to the natural habitat would threaten the existence of orchids in the wild. Therefore, it is high time we realize the importance of conserving the orchids *in situ* for their survival and proliferation - for the benefit of mankind.

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\*All Photographic illustrations are by the author.

## Orchid Show at Cupertino, CA

Srikanth Parthasarathy

During my travels in March, 2015 I got an opportunity to visit the west coast of the USA. To my good luck, I got to know about an Orchid show happening there at that time. Having worked closely with the Orchid shows organized by TOSKAR in Bangalore I was always curious to attend shows organized by others and from a long time. To add to my curiosity the show I was going to attend in Cupertino, CA was an American Orchid Society judged show. I was absolutely thrilled and made sure I spent some good amount of time at the show.

Mahilini Orchid Society at Cupertino were the organizers of this show and the venue was at the Valco Mall in Cupertino, South Bay, CA. It was a Sunday and the second day of the show. I was the first visitor at the venue but for a few volunteers who were arranging the displays and watering them. They allowed me to walk in early and to my surprise there was no entry ticket. The signboard at the entrance said that they organize two workshops a day during the show; growing Cymbidiums and Cattleyas were the two workshops for that day. Most of them sounded very familiar to me yet the feel was very different.

I was super thrilled to see some amazing Cymbidiums and I guess they dominated the show completely. Only the best ones were kept for display and most of them were also the awarded ones. It was a small room where the displays were kept and another room where the society was selling plants. I was attracted to the strong scent of a Dendrobium plant and I got to know from one of the members there that it is an Australian species called *Dendrobium speciosum* Sm.

It was a first time for me to witness the AOS judged show and they had awarded prizes in almost all the categories. There were Dendrobiums, Cymbidiums, Cattleyas, Oncidiums, Phalaenopsis, Papilopedilums and a few other categories. All of the awarded plants were exquisitely beautiful and healthy. *Dendrobium speciosum* Sm. won the prize as the best species.

It was a memorable experience for me. I was completely bowled over by the amazing variety of Cymbidiums and their beautiful blossoms. I was absolutely thrilled having attended the show.

### Some key takeaways:

- Shows can be organized in any scale and still create greater awareness among people about orchids.
- Minimizing expenses on the shows by keeping it short and simple enables orchid societies to focus more on orchid growing and education.
- Displaying the best orchids with proper labeling will help people to know their identities.



Some photographs from the show









Some photographs from the show

## Shade Cloth for Orchid Houses

**K Sriram Kumar**

Shade nets provide physical protection against birds, insects, and radiation. They help in protecting the plants from sunburns and stress due to excessive heat radiation.

There are two crucial parameters for shade net. One is the shading factor (in percentage) and another is color of the shade net.

**Shading Factor**—Shade nets are available in various shading factors; shade nets of a higher shading factor would block more radiation thereby reducing the temperature of air, soil and plants inside the shade house.

Right shading factor for orchids is dependent on the location and elevation of the place. I am using a 50% shading factor cloth which blocks 50% of the sunlight.

To decide whether the shade cloth is providing the right amount of light for the orchids one grows, it is recommended to use a light meter. Standalone light meters are available, or built-in cameras or an iOS app.

Measure the light at various times of the day to determine the amount of sun light the chosen location is receiving and then choose the appropriate shade net with the right shade factor.

Amount of light needed depends on types of orchids grown. For e.g. Vandas require very high intensity light, followed by Cattleya and Dendrobium.

Genera	Foot Candles
Vandas	4000 to 6000 ft-candles
Oncidiums, Dendrobiums and Cattleyas	2000 to 4000 ft-candles
Some Paphs	1500 ft-candles

**Color of Shade Net**— Shade net is usually made out of UV resistant material and scatters most of the UV light. Shade net that scatters the most of the light but does not alter the spectrum of the light provides the best conditions for growth.

Color of shade cloth is an important parameter that needs to be considered for Orchid Houses

Color	Light Scattering	Heat Generation	Full Spectrum of Colors	Comments
Silver color /Aluminum based	★★★★★	None	★★★★★	Best but not available in India
White	★★★★★	None	★★★★★	2 <sup>nd</sup> Best
Red	★★★★	★★	★★★★	Red light increases larger leaf surface, long and thicker stems and promotes early blooming  2 <sup>nd</sup> Best
Black	None	★★★★★	★★★★★	Produces more heat. Not suitable for normal temperatures but could be used in Winter to increase heating
Green	★★★★	★★	★★	Green light is not useful to plants
Blue	★★★★	★★	★★★★	Blue light darkens the foliage and shortens the plant & delays blooming

Black shade net can be used for growing only Vandas as they thrive well under these nets because the extra heat generated by black shade net is beneficial for these orchids.

## CRAZY WORLD OF ORCHIDS!

K. S. Shashidhar

It is beyond anybody's imagination what 'orchid mania' could be unless you are one of the 'victims'. People grow all kinds of flowering plants like, Roses, Gerberas, Carnations, and so on, the list is endless. But none of these catches you like the 'orchid bug'. To quote Joe Kunisch, a commercial orchid grower from Rochester, New York "*you can get off alcohol, drugs, women, food and cars, but once you are hooked on orchids, you are finished. You never get off orchids.....never*". This literally sums up the people who have been 'addicted' to orchids. Let us examine what makes them so addictive???? For most of us, what started as a routine hobby eventually becomes or has (already!) become an obsession and takes over your entire life activities with a single focus and that is **orchids**.

There was a time when orchid growing and its flowers were confined to a few elite growers as it was rather hard to find orchids and much harder to care for, and in addition to being very expensive. With the passage of time, we have orchids everywhere, in restaurants, in marriage receptions, floral bouquets, airport lounges, hotel lobbies, almost every place! This is probably because more and more hobbyists have come into the 'clutches' of orchids and getting addicted to them.

Bob Wertz, a wealthy Wall Street investment banker came across some orchids gifted to him by someone. Till then he never even thought of orchids! And that is all it took. He says "I started with a lot of plants in my bathroom, and then finally built a room; I changed my living room into an indoor green house. This was on the 12<sup>th</sup> floor of an apartment on 71st street in Manhattan with about 4500 plants that I had been growing in my apartment." When even 4500 orchids proved too few, Wertz moved west, to an estate in Santa Barbara. No way could he ever run out of room here. Fourteen years later, his green house is bursting at the seams, even overflowing in to his elegant dining room. They call many of us 'Orchoholics'

There are people who talk about Orchid addiction levels, where level one is you have few orchids and you know what you have and take care of them and have one basic orchid care book to assist you. Level 3 still somewhat makes sense, with about 20-25 plants and a small green house and you are involved in a society like ours and enjoy. However, go to level 6, you are gone! You have no idea of how many orchids you have. You search for orchids all over the wild places. You write personal stories about orchids. There are various nomenclatures used for people who are 'mad' after orchids. It started with 'Orchid Mania', 'Orchidelirium', 'Orchoholics'. Considering the manner it is growing in leaps and bounds, I am sure, many more such titles will come to be known in the future

It all started in the 19<sup>th</sup> century when orchid cultivation took a different dimension with the European travellers bringing in orchids from different parts of the world. Some of these expeditions to discover and collect orchids were financed. Professional collectors travel for months together all over the world in search of new and rare orchids. To access and retain the rare ones these expeditions were kept secret and also to confuse the others, the information about

the location was often misled. On one hand they were collecting these orchids in loads and often tons, but unfortunately, the experience of cultivating these orchids (mainly tropical ones) was least understood and the result was dismal and a total failure killing thousands of these tropical orchids. William John Swainson in 1818 collected some plants from Rio de Janeiro which he sent it to London. While doing so, he used some of the plants as packing material. When one of them bloomed and it triggered 'Orchid Fever' and orchid enthusiasts are still to recover from this 'fever'

By 1900, the orchid craze had no bounds and in 1901, eight 'orchid hunters' went on an expedition to look for rare orchids in the Philippines. While one of the hunters was killed by a tiger, another had oil spilled on him and was burned alive, and five others vanished completely. The man who survived this ordeal collected 7,000 orchid specimens.

Orchid hunters who went to Papua New Guinea were held as hostages. Two members of the party were beheaded before Indonesian troops came to their rescue. Colombia is said to be one of the best places to 'hunt' for orchids, but it also used to be one of the hardest places to survive the 'hunt'. Some were drowned in the fast flowing rivers; some were killed by yellow fever and dysenteries. Albert Millican a painter and an orchid hunter knew that hunting for the orchids was a dangerous business. He mentioned that his expedition's supplies included stock of knives, cutlasses, revolvers and a rifle. The competition to collect rare orchids was very intense amongst the 'hunters'. William Arnold (an orchid collector) had a confrontation and quarrel with another 'hunter', his employer asked William Arnold to follow the other man in order to collect the same specimen he was collecting and try to urinate on the other man's collection so that his collection will be killed!!! Such was the intensity of animosity. Surprisingly, even if the collectors were homesick and lonely, they never made friends with the other collectors.

There are numerous intriguing and bizarre stories from the past about orchid hunting and the expeditions for collection of rare orchids. The stories are not only from the past, but even now it continues. You cannot imagine police protection for a plant! Yes it is for an orchid that too for the Lady Slipper *Cypripedium calceolus*. Perhaps just a few of these plants might be remaining in its natural habitat. Loss of habitat and also over collection by orchid enthusiasts resulted in the decline of its population. One of them flowering in wild was found in Silverdale Golf club in Carnforth, England, and the same was almost like a show or exhibition visited by many people.

As the plant puts out its bud, British police are engaged in guarding it as there have been earlier efforts to steal the plant by the collectors. Earlier in 2004, a collector tried to uproot and steal the entire plant in vain. He could get only a part of it. Again after some time, a large segment was cut off by another collector. I am not sure how much price it would have commanded in the market? However, it is learnt that cuttings made legitimately have fetched as much as 7500 British pounds and above!!!!

In India also there has been 'orchid hunting' during the British period. In 1831 when Robert Wight took about one hundred thousand specimens weighing almost two tons, it was known to be a modest collection! Later Hooker, carried tons of living plants from Himalayas. It is mentioned that on one such occasion, seven headloads of a single species of *Vanda coerulea* was carried from the Khasi hills of Meghalaya (present day) and most of them died before reaching England. But what it did was, to set a trigger for search and collection of the most wanted and

mystique flowering plant from the Tropics. Hooker estimated that an orchid collector can earn as much as 2000-3000 British Pounds in one season from the sale of Khasi orchids. Such was the magnitude of denudation that in search of one species, several thousands of species were lost and the forests were 'cleaned'. Then the camp will move on in search of newer species.

An interesting story goes for the 'Lost Orchid' – *Paphiopedilum fairrienum* from India. An English collector came across this wonderful species in NE India and carried four plants to England. Any amount of request, inducement did not make him reveal the location from where he collected these specimens, he kept it secret and his intention was to go back and get more of these. Eventually these four plants died and he also could not make it to India again and he also died and the mystery of the location of the 'Lost Orchid' remained a secret. Then collectors could not keep their eyes off this wonderful species and one of the English horticulturists offered prize money of thousands of pounds. This reward renewed and re-energized further efforts from the 'hunters', eventually they could trace a few specimens almost on the borders of Myanmar.

Well there are several such stories all over the world narrated by the collectors and also people who had access to whatever little documentation done on these sojourns. Several people have lost their lives in the process. This is just the tip of the ice berg which narrates and brings out the jealousy, enmity, possessiveness and selfish nature of the collectors who will always be longing for that ONE ORCHID which will be in his lone possession and nobody else has. The crazy world of orchids continue to overtake and possess the Collector which no other flowering plant has done in the past and may not do so in future.

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