



# TOSKAR NEWSLETTER

A Quarterly Newsletter of the Orchid Society of Karnataka (TOSKAR)  
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THE ORCHID SOCIETY OF KARNATAKA  
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## TOSKAR NEWSLETTER

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(Vide Circular No. TOSKAR/2016  
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#### Front cover –

*Dendrobium unicum* Seidenf.  
by Dr K. S. Shashidhar

### ***From the Editor's Desk***

21<sup>st</sup> June 2017

The much-awaited monsoon has set in and it is a sight to see shiny green and happy leaves and waiting to put forth their best growth and amazing flowers. Orchids in tropics love the monsoon weather and respond with a luxurious growth and it is also time for us (hobbyists) to ensure that our orchids are fed well so that plants put up good vegetative growth. But do take care of your plants especially if you are growing them in pots and exposed to continuous rains, you may have problems! it is alright for mounted plants. In addition, all of us have faced problems with snails and slugs, watch out for these as they could be devastating. Take adequate precautions with regard to onset of fungal and bacterial diseases as the moisture and warmth is ideal for their multiplication. This is also time for division or for propagation if the plants have flowered.

Many of our members are growing some wonderful species and hybrids in Bangalore conditions and their apt care and culture is seen by the fantastic blooms. Here I always wanted some of them to share their finer points or tips for care with other growers. But, I am not sure why they are not ready for this, hopefully sometime in future they come out and share these with our fellow members.

The Bi Monthly Meeting was held on 22 April, 2017 and a wonderful talk on how he is growing his orchids in Sydney by Mr. Ramakrishna was well received by the members. There was a good display of species and hybrids by the members and few of the winners and details are given in the proceedings.

Every effort is made to improve the quality of the newsletter in terms of good articles for hobbyists, serious orchid enthusiasts. Sharing of experiences has attained a new dimension with Dr. Hegde and me visiting one of our members (Mr. Balanarasimha) place to interview him as to what orchids he has been growing and how. This issue carries the interview and an insight as to how he is growing his *Dendrobiums* and *Cattleyas*. This should encourage other members to come forward with the assistance of our team you can share your experiences. Another interesting article in this issue is by Dr. Ameya Bhide, he writes on how speciation could occur in nature and also about the present classification methods with simple illustrations. A wonderful theme of this year's festival at Royal Botanical Gardens is India's orchids. A nice article with beautiful pictures from Ms. Bala makes it an interesting one. Dr. Hegde continues his article with another part on legislations, *in situ* and *ex situ* and bio

technological approaches to conservation of orchids in India. Most of our members are growing Dendrobiums fairly well in Bangalore conditions, Suresh Kalyanpur shares his experience about growing Dendrobium species in these conditions. The crazy and mad world of orchids have innumerable stories of greed, cheating, disasters and loss of lives, ‘Orchid Hunting’ by Dr. Shashidhar narrates few incidents as how it went on in 19th century and how it is now. A short but interesting write up by Sriram Kumar is on the colors of the orchids.

The issue also has some important news and notes regarding orchids. I hope this issue will also be well received and your comments and suggestions for its improvement is ever welcome.

*“Orchid hunting is a mortal occupation.”* - Susan Orlean

Dr. K. S. Shashidhar  
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# **Orchid Festival at Royal Botanic Gardens, Kew 2017**

## **The colours of India**

**Bala Kompalli M.sc.,**

Orchid festival at Kew has been running for a period of 22 years every year. Since last year orchid festival is built around a country's theme like last year it was Brazil with spectacular floral displays of Orchids, Bromeliads, Anthuriums, and other beautiful plants. This year the orchid festival was celebrated at the Royal Botanic Gardens, from 4<sup>th</sup> of February to the 5<sup>th</sup> March 2017. The theme of this year's festival is India as it is British council's India-UK cultural exchange year. There are around 6000 of different types of orchids and other plants out of which 3000 are Phalaenopsis, 300 are Dendrobiums of various colours. A huge Indian flag is made of Chrysanthemums. Visitor numbers were around 1, 21,000 which is over 4000 more than last year a good sign of interest of public. There was a wide media coverage including some Indian newspapers on the opening day of the festival.

As my work is involved more behind the scenes where over 10,000 living orchid species from all over the world taken care of, my team selects beautiful flowering orchids from our glass houses every week and deliver them to Princess of Wales conservatory to arrange them in display cases. Princess of wales conservatory which is a big display glass house opened to the public. This glass house has lots of tropical plants along with orchid displays are enjoyed by thousands of visitors all-round the year making them understand how beautiful species orchids from tropical and subtropical forests faraway look, and how they are cultured at Kew. This is a unique experience for the public without being able to travel so far.

There were different designs of displays made involving a number of staff and volunteers to create giant animal figures like an Indian elephant made of Tillandsia moss, a peacock and a tiger made of different foliage and orchid flowers. Entire Princess of wales conservatory was decorated with various beautiful orchids, bromeliads and other tropical floral displays and a nicely decorated market place displaying the spices, wooden baskets filled with flowers to look like an Indian market scene.

Public enjoyed this street market scene with a wonderful background music playing the bicycle bell sounds of milkmen, newspaper boys, playful voices of school going children in the morning, temple bells, muezzin calls, the Indian street is brought to life. On this occasion, there were different activities for children involving block painting, Bodhi leaf colouring, mandala design colouring etc., There were many sessions for visitors like short learning courses in orchid care and culture, talks from Kew staff. I gave few lectures on my field trips to western Himalayas studying orchids in their natural habitat and about care and culture of orchids at Kew. Our Research leader from herbarium Andre Schuiteman gave lectures on some fascinating facts about Indian orchids.

The catering was filled with many Indian food delicacies to bring the tastes from our Indian traditional cooking. Visitors were engaged in enjoying films showcasing the uses of flowers and

plants in everyday life in India, from medicinal uses of herbs, the role of flora in culture and customs. Kew also opened 'Orchid lates' inviting public to visit during some evenings to see the wonderful floral displays in colourful lighting while enjoying the live violin concerts and food. All the sounds, scents and lights brought the dull, cold nights of London to a bright, lively feeling of an Indian street with a wonderful experience.

The entire orchid festival gave a very good feel of Indian culture with vibrant colours, plant life making this place a tropical paradise. Personally, I always enjoyed my work here as a Botanical horticulturist and this festival made me feel close to home.





Tulsi plant is given a centre stage on the swing surrounded by orchids









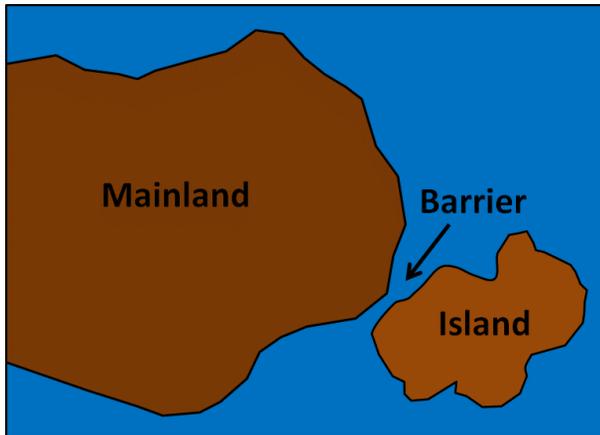




# Orchid Illusions: Nothing is as it seems or is it?

By Ameya Bhide

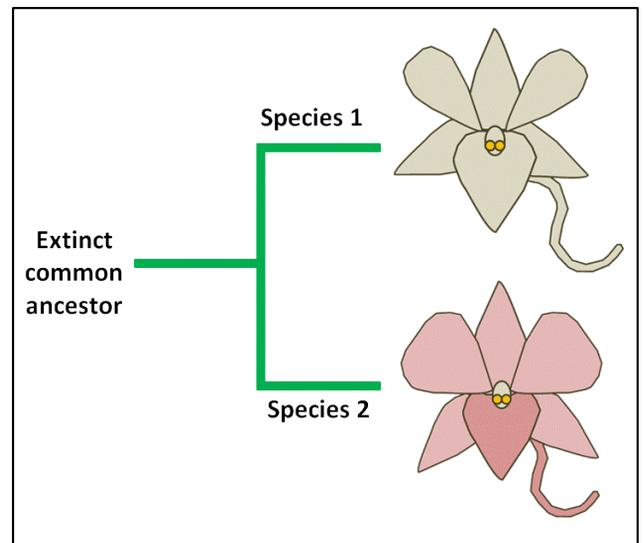
I have been meaning to write this article for a long time, but due to time constraints could not do it before. It is not meant to belittle any school of thought in taxonomy nor to support molecular taxonomy as the ultimate word of taxonomy gods. This is my attempt to explain in plain language why some of the re-classifications based on DNA methods may seem against what common sense dictates based on morphological observations. We are going to travel back in time and trace the evolution of a group of orchids to the present day.



**Figure:1**

The story begins after the cretaceous period, the dinosaurs are long gone and the flowering plants or angiosperms are diversifying and supplanting the gymnosperm cycads and conifers as the dominant plant life on the earth. There is a tropical continent X and a newly formed island to its south east separated by a narrow strait a couple of kilometres wide as shown in figure 1. The continent is home to myriad species of orchids among them species 1 and species 2 which are very closely related and arise from a common ancestor, as shown in figure 2

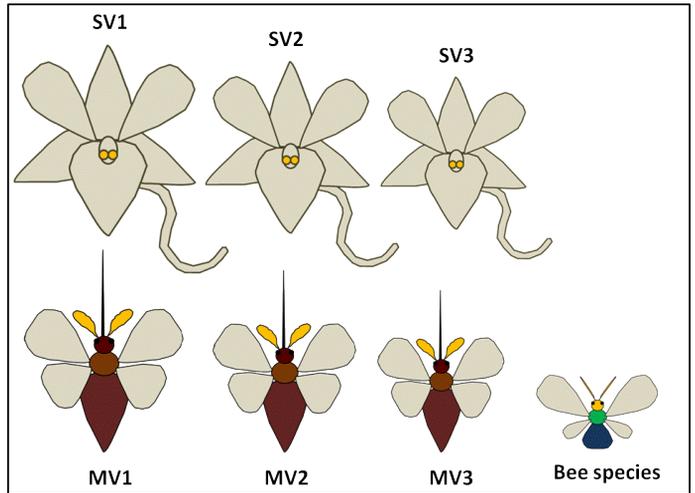
Species 1 has evolved tightly along with its pollinator, a nocturnal moth species that depends on the fragrance this species produces to find the flower at night, hence this species has lost the need to have coloured petals. Species 2 the sister is pollinated by a diurnal butterfly like species that depends on the flower color to find it and hence this species has retained the colored petals and still produces fragrance but as the butterfly does not need this, this quality is not under selection. Both species though maintain a common theme, they reward their respective pollinators with nectar produced at the tip of the long spurs.



**Figure:2**

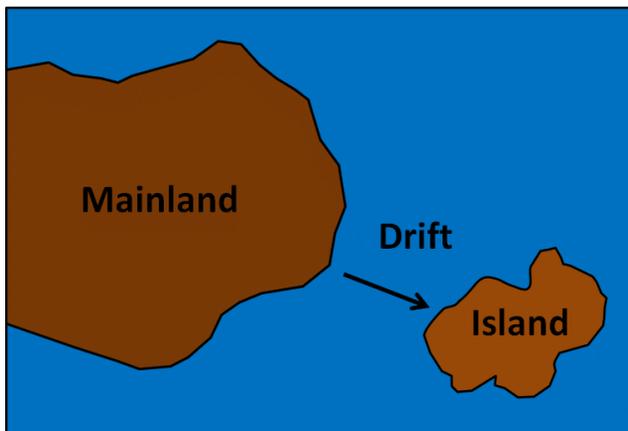
Species from the mainland soon start colonising the newly formed island and pioneers of species 1 establish a colony there. These pioneer plants populate the island and spread, a point to note is that the entire population on the island traces its origin to only a few pioneer plants that colonised the island, so that the individuals on the island are more closely related to each other than the individuals of the same species on the mainland. This is a common theme of island colonisations. Naturally also the pollinator moth species of species 1 makes it to the island .

Variation is the raw material on which evolution works to fine tune adaptations and create new species. So as it has it the flowers of species 1 has 3 size variants, the biggest are SV1 and the smallest SV3 and a median form SV2. Just as the orchid species, the pollinator moth species also has 3 size variant MV1, MV2, MV3 respectively with differing lengths of their proboscis used to collect the nectar as shown in figure 3. The flowers have differing lengths of the spur where the nectaries are and the length of the proboscis and the spur need to be a close match to achieve feeding and pollination.



**Figure:3**

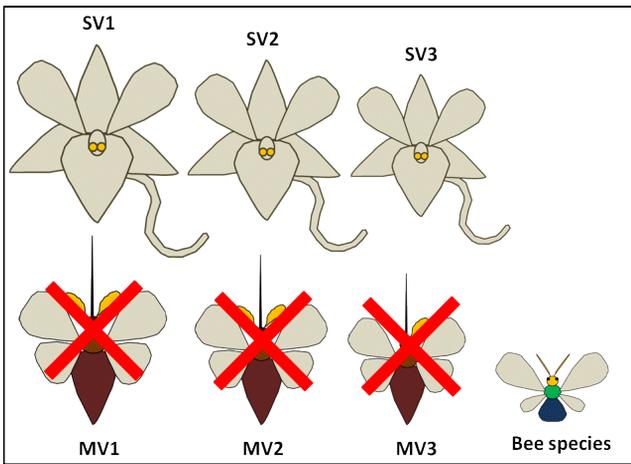
Therefore already a process of reproductive isolation has begun where MV1 moths can feed on and pollinate SV1 and SV2 plants but not SV3 plants and MV3 moths can only pollinate and feed on SV3 and SV2 plants and not SV1 plants. But the MV2 moths owing to their intermediate size are still able to feed from all 3 plants and hence speciation has not begun as crossing between SV1, SV2 and SV3 plants is still achieved by the MV2 moths. It is also time to introduce another key player, a bee species that is not a specialized pollinator of orchid species 1 and does not feed on its nectar but the male bees use the fragrant wax the flower produces to attract the females, and while doing so it sometimes achieves pollination.



**Figure: 4**

Now we take a leap a few thousand years forward, a mere blink in the eye of evolution but not geology. The island has been drifting further away from the mainland and reintroductions of plant species to the island from the mainland is a very rare phenomenon due to the water barrier a few hundred kilometers wide. So the island population is basically a subspecies population of the mainland species. This is when catastrophe strikes. El Niño like warming of the ocean currents around the island changes the

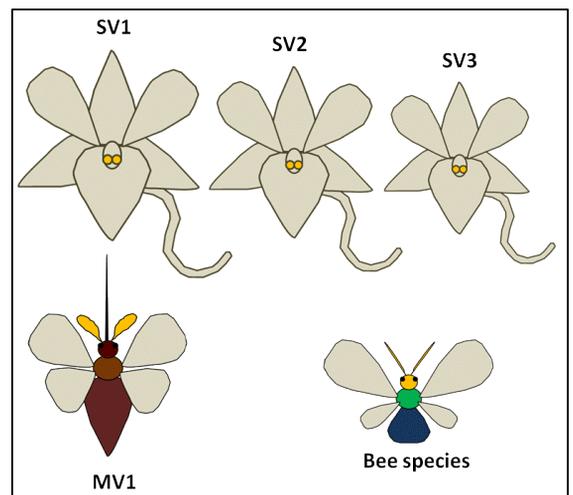
weather pattern changing seasons with tropical rains battering the island for years on end. This negatively affects the flowering of the orchids of species 1 which depend on cooling currents in winter to bring down the temperature which initiates their flowering cycle. Even though the orchid species 1 survived the catastrophe, with virtually no flowering for a decade the native pollinator moth population is completely decimated as they depended on the nectar of species 1 for sustenance. But the bee species which depended only on the fragrant wax survived the mayhem as it could do away with fragrant waxes of other flowers as depicted in figure 5.



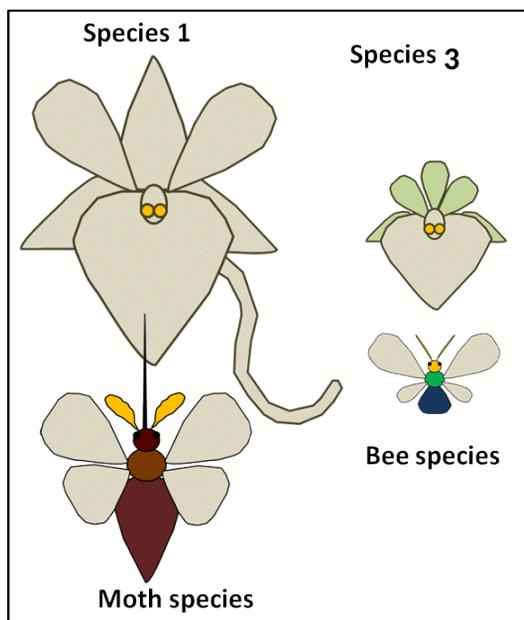
**Figure:5**

But all is not lost, even though the plants are unable to migrate between the island and the mainland the pollinator moth species can. Tucked away in the sheltered mainland with milder less erratic climate a population of the pollinator moths has survived and is thriving. But there is a slight glitch only the bigger MV1 variety of the moths is able to undertake this journey owing to their higher fat reserves, the smaller MV2 and MV3 moths perish at the sea. Thus the island now has all the three species 1 variants but only the big sized moth variant MV1 and the bee species harvesting wax from the flowers as shown in figure 6.

But as the MV1 variant of the moth is able to pollinate and feed of only from SV1 and SV2 plants a reproductive barrier is created between the SV1, SV2 plants on one hand and the SV3 plants on the other. The infrequent unspecific cross pollinations by the wax gathering bee are not sufficient to keep the species homogenous but these pollinations are sufficient for the SV3 variant to survive and evolve on its own, though now on a different selection regimen. For the SV3 variant to survive in the long term it needs to form a special relationship with the bee species as its sole pollinator and the rewards it offered in the form of nectar in the spur are no longer the selection criteria but the fragrant wax. Under this selection only the SV3 plants that produce copious amounts of highly fragrant wax would be pollinated and the ones that produce only small quantities would be weeded out from the species gene pool.

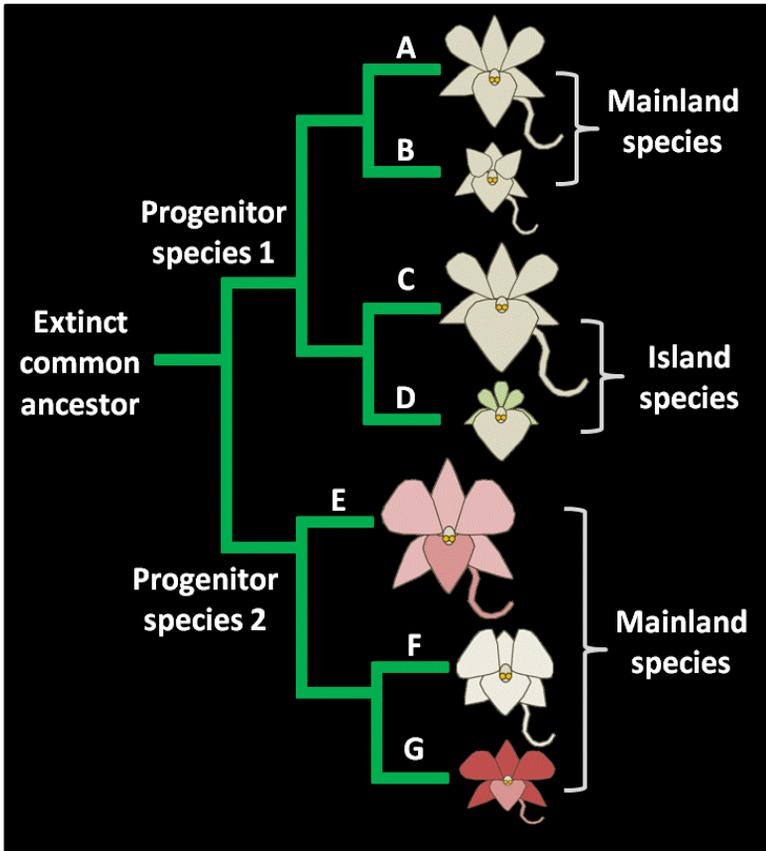


**Figure:6**



**Figure:7**

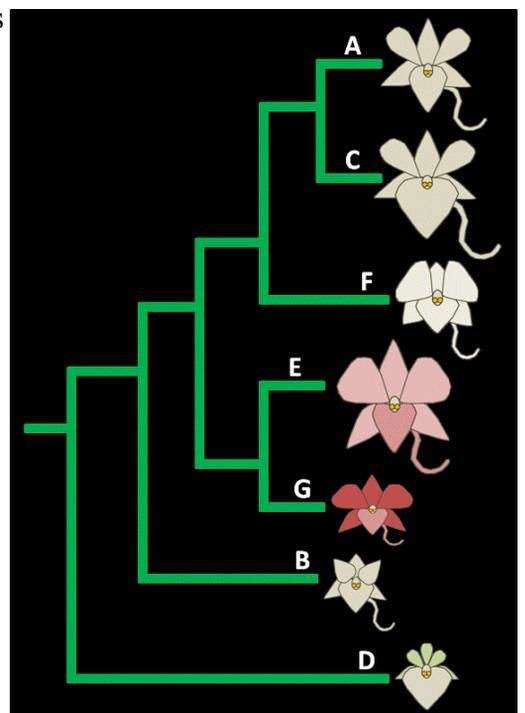
Now we take a much longer leap, a couple of million years ahead to present day. All the major players in our story have made it through millions of years of climatic and geographic upheavals Their partnerships and adaptations have co-evolved for these millions of years refining them. The SV3 variant of the orchid species 1 which could no longer be pollinated by the moth species but only by the wax collecting bee has evolved into a completely new species called species 3 (so as not to confuse with the original mainland species 2). This new species 3 is completely different from its progenitor ancestor. It has completely lost the spur and the nectaries therein, it has a much smaller size, reduced dorsal and lateral petals which are green due to the chlorophyll as shown in figure 7. It also has compared to the flower size huge glands that produce highly fragrant wax very different in smell and composition compared to the original



**Figure:8**

flowers and differences in petal shape etc (B). As shown in figure 8 the original day pollinated species 2 also has undergone evolution and speciation independently. One of the modern day species evolved from this ancestor looks very similar to it with big pink coloured flowers with long spurs and nectaries, whereas one of the offspring species evolved smaller more brightly coloured flowers (G) whereas evolution repeated itself once more and one of the day pollinated species lost its ability to form pigments (F) and now looks similar to the night flowering species derived from progenitor species 1.

So eventhough species D might not resemble any of its close and distant cousins according to its flower morphology it fits right into the species phylogeny as it is most related to the very different looking species C. It is very different looking simply because it underwent a very different selective regimen as compared to its sister species. On the otherhand eventhough species A, C, F look very similar they actually have quite distant ancestors. Such cases are referred to as convergent evolution wherein different species evolve similar characteristics and features due to common selection pressures. If we did not know this story of speciation, based on just the morphological features we would be very much tempted to create a phylogeny as shown in figure 9 where species D is the most distantly related to all other species, which we now know is not correct.



**Figure:9**

On the otherhand the subspecies of orchid 1 on the island has evolved a bigger flower due to the weeding out of the latent SV3 gene pool in the SV1 population. It has a still longer spur and bigger nectaries. Similarly evolution and speciation has been happening on the mainland (figure 8). Since all the three variants of species 1 were able to survive and breed on the mainland the flower size of the subspecies of orchid 1 on the mainland (A) is smaller compared to the island relative (C), and now the subspecies have truly differentiated into separate species due to these changes. Also parallelly the SV3 variant of species 1 was able to refine its relationship with the smaller variant of the moth species and this led to the formation of another species with much smaller

The other problem we would encounter in these situations would be lumping or splitting of the genera.

The other problem we would encounter in these situations would be lumping or splitting of the genera. For e.g. In figure 8 If we wanted to say that species A, C and E belong to say genera 1, species B, D, F and G automatically belong to the same genera as they all share a common ancestor. We could not say that species A, C and E belong to genera 1 but species D belongs to genera 2 as this would be a falsification, so we would need to lump together very different looking species into one genera. The other option would be splitting, wherein we would say species A and B belong to genera 1, C and D to genera 2 and so on but then that creates a problem for classical morphological phylogenies where very similar looking species are put in different genera as would be the case with species A, C, E and F.

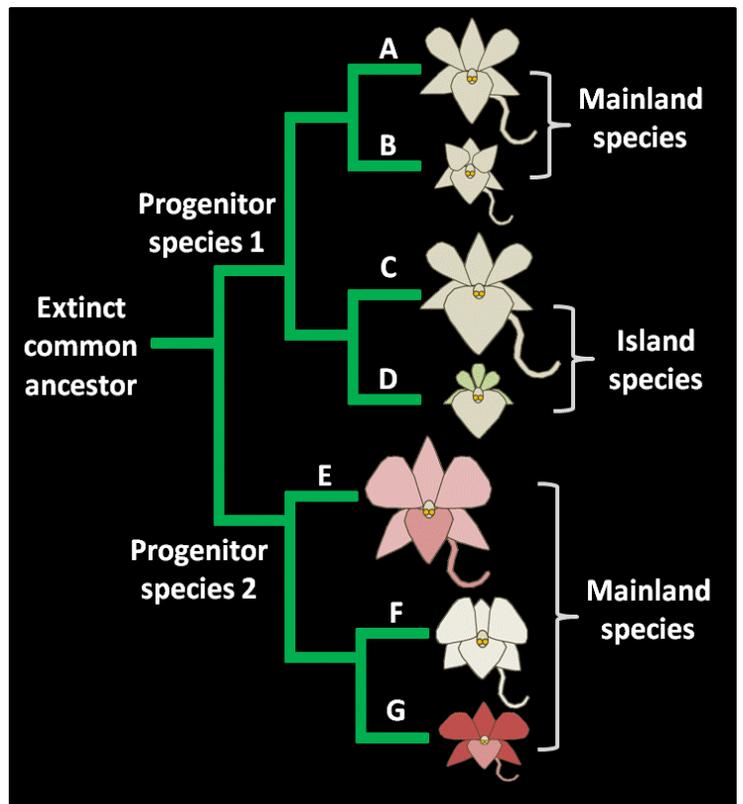


Figure:8 again for reference

This example was just a super simplification of the actual phenomenon that is evolution, just to show what can and has happened in the past and continues to this day. So the next time you see Sedirea put into Phalaenopsis or Schomburgkia included in Laelia consider this possibility instead of bashing molecular studies right away. I am not saying that all the molecular studies published should be accepted at their face value because just as the morphological classification has its glitches so does molecular work.

But then why do molecular studies at all and how do DNA studies get over problems as illustrated in this article? This question I will address in another article as and when I get time. I hope this helps anyone open minded to think.

## GROWING DENDROBIUM SPECIES IN BANGALORE

Suresh Kalyanpur

My tryst with orchids started way back in 1973 when I chanced upon a beautiful book entitled “Orchids” by Opllt and Kaplicka. This led to buying my first orchid a Dendrobium from late Deb Narayan Pradhan of M/s. Janak Nursery in Siliguri. Over the years as my collection has grown it has given me many opportunities to get to know and make friends with some wonderful people within the county and overseas.

I remember an acquaintance telling me ‘*never ever give unsolicited advice*’; I cannot help speaking about it because if can help someone, why not? Over the years my adventure with this hobby has had its ups and downs, prompting me to share a few tips with the many who are venturing into this lovely journey. So here is my ‘two penny’ bit. One, start with a genus that will adjust and grow in the climatic conditions of your town or city; second, don’t be in a mad rush to buy every pretty blooming plant you see at the local nursery or orchid show, it may require more care and attention than you are capable of providing and third, for the many of us who live in city apartments and small independent houses, grow your collection only to the level you enjoy it because I firmly believe ‘a hobby should not rule your day-to-day life’.

This article is an attempt to share with you, the experiences of a few of us in Bangalore, on how to grow Dendrobium species mainly from North East parts.

The genus Dendrobium is the second largest in the orchid family and exhibits several differences in its morphological features - displaying canes from three meters length to small plants of a few millimeters. The flowers could be of varying sizes also, from twelve centimeters to a tiny two millimeters. The leaves can also show lots of variation from long cylindrical type to small, flattened ones. The conditions in which they grow is also quite varying.

Now coming to our Dendrobium species, especially those growing in the North East and the foot hills of the Himalayas, most of these species are deciduous, shedding their leaves in winter with flowers appearing on the leafless stems in spring.

Of the 1200 species of Dendrobium in the world, India is home to as many as 103 species. A majority of these (about 82 species) are distributed in NE Region. There are about 18-20 species of Dendrobiums in Western Ghats Region. Many of the Dendrobiums of the North East are ornamentally beautiful and have been used for breeding many of the glorious hybrids that you see in nurseries and shows all over the world.

I am going to list about sixteen Dendrobium species that grow fairly well in the climatic conditions of Bangalore. Please however remember that between October and February some of them may present a woeful picture of drying leafless twigs. But with the onset of spring they will

burst into flowers giving you that joyous experience of seeing your year-long effort bearing beautiful flowers.

***Dendrobium lindleyi* Steud., (= *D. aggregatum* Roxb.)** is a small sized, hot to cool growing epiphyte found in Assam at elevations of 400 to 1300 meters. This plant has short, thick pseudobulbs, usually covered with a thin, papery covering called 'sarong' that protects new growth. The leaves are short, thick and tend to be a dark but lighten with exposure to the sun. It blooms in Bangalore during February and March and has very delicate orangish yellow flowers, with an orange blob at the throat. It emits a faint smell of honey in the early morning and evening hours when there is dim light.

In general, ten to twenty flowers will develop on an inflorescence. This plant grows best mounted due to its epiphytic nature. When potted use a medium such as charcoal, brick pieces, cork, fern bark, or teak. This species needs a lot of diffused sunlight. During the plant's winter rest, the amount of sunlight should be maintained.



***Dendrobium aphyllum* (Roxb.) C.E.C.Fisch.**

This species is also known as *Dendrobium pierardii* and *D. cucullatum*. It is found growing in Assam, Andaman Islands, Bangladesh, eastern and western Himalayas in India. A large sized, hot to cool growing, epiphytic species, the grows at altitudes of 150 to 1500 meters in evergreen low land and primary mountain forests. Deciduous by nature, they produce long pendulous canes and blooms between February and March in Bangalore and has a short inflorescence with 1 to 3 fragrant, short-lived, fragile flowers, strongly scented of violets. The flowers are pinkish violet in colour with either a white or a yellow lip. The lip is trumpet-shaped, variable in width, pale yellow or less often whitish at the base, with dark violet branching veins inside the tube-shaped part, and densely covered with soft, short hair on the exterior surface and along the margins, except in the basal part. The flowers are flimsy and short lived, lasting about a week. These are borne on the previous year's canes. Mounting is a necessary to accommodate the pendant canes. A drier winter rest with no fertilizer is essential to ensure early spring blooming. Start watering and fertilizing with the onset of new growth.



***Dendrobium aduncum* Lindl.** This species is found in Assam, eastern Himalayas, Bhutan and, Sikkim growing in subtropical and evergreen lowland forests, near rivers and at elevations of 300 to 1300 meters. A medium sized, hot to cool growing epiphytic species with many pendulous branching canes. Inflorescence appear, between April and May in Bangalore, from the leafless nodes at the apex of older canes in the spring



through fall with 2 to 5, long-lasting, fragrant pinkish violet flowers with two oblong maroon spots at the base of the column. This species is



best mounted to accommodate the growth and flowering habit and needs ample humidity and water with only a short 3 to 4-

week rest from water and fertiliser in the winter.

***Dendrobium bensoniae*. Rchb.f.** The plant is found in Assam, is a medium sized, hot to cool growing epiphyte found at elevations of 450 to 1550 meters with yellow, fleshy, erect or pendulous, cylindrical long stems with deciduous leaves that blooms on a pendant, 2” long, with white



fragrant flowers bearing a yellow throat with two oblong black spots at the base of the column. The flowers bloom in the spring between April and May for growers in Bangalore. Through the winter months this plant should be watered less frequently but not allowed to dry out completely. Once the period of hibernation is over and you see signs of new life like roots or leaves sprouting, start with a dose of seaweed extract, this should help the plant to wake up and put out new healthy roots and growth. Fertilise and heavy watering throughout the growth cycle are instrumental in optimum plant growth and mounting helps its growth better.

***Dendrobium chrysotoxum* Lindl.** This is one of the beautiful dendrobium species from North Eastern parts of India, producing arching golden yellow coloured flowers. Also known as the Golden Arch Dendrobium, it is a stunningly beautiful orchid. The plant is adored for its arching spikes of 4 cm waxy, bright orange fragrant flowers, with fringed lip. The species is native to the Eastern Himalayas and Assam in India, and Bangladesh at elevations of 700 to 1100 meters. It prefers cool to warm conditions.



The pseudobulbs will have two (or even three) extended, oval shaped tough and leathery leaves. The leaves are oblong to lanceolate, coriaceous and acute. Blooming starts with late winter through spring. The 12” [30 cm] pendulous inflorescence arises from nodes near the apex of the pseudobulb with highly fragrant flowers which smell of honey but are short lived. The flowers are yellow, with an orangish -yellow lip with a frilly edge.

***Dendrobium densiflorum* Lindl.** This is a densely flowering species and is also known as the Pineapple orchid because of the inflorescence resembling a Pineapple. This is one of the most spectacular orchid species among the dendrobiums. A popular species cultivated widely, it is easily identified by its cluster of flowers hanging down. This species is classified



under section Callista. In India, NE is the natural home of this species. Generally, grows at an altitude of 1000 M as an epiphyte. In conditions like in Bangalore it will flower between the months of March and April. The pseudo-bulbs are 30 – 45 cm long, with several angles and about 2 cm in diameter. Its dark green leaves numbering 3-5 remain on the pseudo-bulbs and are generally grouped at the apex. A hardy species, can be grown in hanging pots.

***Dendrobium draconis* Rchb.f.** This is a small to medium sized, warm to cool growing epiphytic orchid that is found in Assam at elevations of 700 to 2000 meters with tufted, slightly fusiform or



clavate, 8 to 9 node stems with sheaths covered in black hairs and carrying rather leathery, dark green, bilobed leaves. The plant blooms in the early spring throwing up 2 to 5 white flowers with a bright orange throat. The flowers are long-lived, fragrant smelling of tangerine arising from nodes near the apex on older canes. It requires a drier rest period in the winter with fertilizer and water commencing with the new growths.

***Dendrobium farmeri* Paxton** This is a pendulous, hot to warm growing epiphyte has clavate or fusiform, 4 angled stems carrying 2 to 4 leaves and is a spring blooming orchid that has



approximately 8" long, densely flowered inflorescence that arise from the nodes near the apex of leafless and leafed canes. The *farmeri* is found in the eastern Himalayas, Assam and Nepal in evergreen lowland forests and primary forests at elevations of 150 to 1000 meters on tall trees high up over river courses. The plant prefers some shade and heavy watering with a short winter rest. The farmer flowers between February and March and is a white or a light pinkish violet bloom with a yellowish orange throat. The *farmeri* does not bloom if kept in shade, so growing it in the sun is recommended. Blooms once a year in spring and blooms can last 2-3 weeks with good care. Could be grown as

mounted or potted but does better if it is mounted.

***Dendrobium fimbriatum* Hooker.** This is also known as the fringe tipped dendrobium. This species is found the western Himalayas, Bangladesh, eastern Himalayas, Assam, Nepal, Bhutan and Sikkim. Grows in humid, mossy mixed and coniferous forests at elevations of 800-2400



meters and is a large-sized, warm to cold growing epiphyte, lithophyte or terrestrial. It has long, erect, arching or pendulous, light-yellow green long stems that are thickest in the middle and have many oblong deciduous leaves. The *fimbriatum* flowers in March through May but can bloom at almost any time on a pendant, with many [6 to 15] flowered raceme that arises from the nodes near the apex of leafless and mature canes. Watering should be heaviest in the summer but they need some water even during their winter rest. They have a pendant growth habit so they are best mounted on a slab of tree fern or cork. The flower is a golden yellow with a slight

orange tinge on the lip



yellowish orange lip.

***Dendrobium formosum* Roxb ex Lindl** It is found in Assam, Bangladesh, eastern Himalayas, India, Nepal, Sikkim and the Andaman Islands. It grows at elevations of 900 to 2300 meters and is a small to medium sized, warm to cold growing epiphyte with medium sized, terete, erect stems that are leafy in the upper half. The formosum blooms in the fall to winter on a short, axillary or terminal raceme with 1 to 4, fragrant flowers that arise from the nodes near the apex of the leafy mature cane. This species does well in wood slat baskets. The flowers are a very pretty white with a

***Dendrobium heterocarpum* Wall ex Lindl.** This can be found from Assam, eastern Himalayas, Nepal, Bhutan, Sikkim up to Sri Lanka, in evergreen lowland and primary mountainous forests



pendulous stems.

as a large to giant sized, hot to cool growing epiphyte at elevations of 100 to 1800 meters. It blooms in the winter and spring on 2 to 3-year-old leafless canes that arises from the nodes, displaying several, long-lived, fragrant white flowers with a yellow lip on which can be seen deep orange veins. Water and fertilizer should be reduced from the fall through the end of winter and resumed with the onset of new growth in the spring. This species is best accommodated by mounting on tree-fern or cork mounts or in a small hanging pot as it has long

***Dendrobium lituiflorum* Lindley.** This species needs plenty of watering right through spring and autumn and then almost no water is needed till after blooming in February or March. The



inflorescence throws up 1 to 5, long lasting, fragrant magenta pink flowers with a white throat and a marron blob at the base. These flowers which appear in early February last for up to 2 weeks are deliciously scented. It is normal for it to drop its leaves in the dry season. This plant is best mounted on tree fern as it has a very pendulous growth up to 35" long. This plant is found in Eastern Himalayas, Assam and Bangladesh, in broadleaved forests on tree trunks at elevations around 300 meters as a medium sized, hot growing epiphyte and has clustered, slender, reed-like, pendulous, 11 to 15 nodes, swollen stems carrying deciduous, fleshy, linear-lanceolate leaves.

***Dendrobium moschatum* Sw** It is found growing from western Himalayas, eastern Himalayas, Assam, Bangladesh, lower India, Nepal, Bhutan and Sikkim in open forests on tree trunks at elevations around 300 to 900 meters as a large sized, hot to warm growing epiphyte with erect, arching or pendulous stems. It blooms in the late spring and early summer on an axillary, pendulous, 8" long, flowered inflorescence with musk scented flowers, that last about a week, arising at or near the apex of a leafless cane. Water and fertilizer should be reduced through the winter months and resumed with the onset of new growth in the spring.



***Dendrobium parishii* Rehb.f.** It is found in Assam, Bangladesh and the, eastern Himalayas. It grows in the evergreen, lowland forests and primary montane forests at an altitude of 250 to



1700 meters as a medium sized, hot to cool growing epiphyte. Flowering occurs from February through August with a peak season of May and June on a short, 2 to 3 flowered racemes with fragrant long-lasting flowers that are borne at the nodes on the upper half of 2-year-old, pendulous, leafless canes. The flowers are a deep violet pink with a white lip with a big maroon blob at the base of the column. Some shade and plenty of water is essential when the new growths appear. As the growing season progresses, the light should be increased as the new growths mature. In the autumn, less water should be given before a drier winter rest to initiate blooming in the following season.

***Dendrobium primulinum* Lindley.** This grows in Assam, Eastern Himalayas, Nepal, western Himalayas and the Andaman Islands. This is a large sized, warm growing, pendant epiphyte found on deciduous trees at elevations of 500 to 1000 meters where they need direct sunlight for at least 3 hours a day. This plant has clustered, ascending, prostrate or pendulous stems covered in white sheaths and blooms in the winter through summer on a short inflorescence with minute bracts and 1 to 2, fragrant flowers. The flowers are of a light pink shade with a large white lip carrying a big yellow center. The *D. primulinum* needs lots of water and fertilizer after the new growth begins, lasting through late September when it is time to stop water and fertilizer until the new growths begin again.



***Dendrobium thrysiflorum* Rchb.f.** This grows in Assam and the eastern Himalayas at elevations of 1200 to 2000 meters as large sized, cool to warm growing, epiphytic, lithophyte or terrestrial species found in humid, mossy mixed and coniferous forests. It blooms in the spring on a pendant like, 12" [30 cm] long, densely fragrant flowered raceme that arise from near the apex of the cane. The flowers are white with a big bright orange lip. Mount on driftwood, water sparingly through the winter months and reduce the fertilizer until the initiation of new growth in the spring. Then full on watering and fertilizer till fall. Air circulation and bright light are essential for blooming.



Let us now start looking at how should we grow these species to ensure a successful outcome?

The first question before you would be where do we procure these *Dendrobium* species from? Many nurseries are importing *dendrobium* species which are cultured in the lab and grown and propagated in nurseries. Flasks of these species are also available. In addition, our society provides a platform for exchange of species. Please remember **Don't collect plants from the wild.**

When selecting a plant look at the condition and health of the plant. The plant should have few previous year's canes/pseudo-bulbs, which have shed their leaves, and a few growths of the current year. Ideally there should be in all at least 5-6 canes or bulbs. The current year's growth will have plenty of white roots which are annual, look for them before buying or exchange.

After you have selected a healthy species plant, next is "should I mount or pot and if I choose to pot it what media should I be choosing" are some of the questions. Most *dendrobium* species do very well when mounted on drift wood, tree fern bark or even a piece of wood with a wad of moss. Especially some species like *D. aphyllum*, and *D. chrysanthum* have a growth habit of pendulous long canes which needs to be mounted rather than potted. However, in Bangalore

conditions, mounted plants would need to be sprayed and watered on almost a daily basis, especially during the summer months and during other times about 5 times a week. Dendrobiums when they put out new growth in spring, need plenty of water and nutrition. This is the foundation for their good flowering at the end of the growth. Hence, mounted plants can be watered on a regular basis in Bangalore without the apprehension of over watering. Our experience suggests that small plants can be mounted on piece of wood or bark and then kept in a pot, filling the rest of the surrounding area with moss, charcoal and wood chips, before hanging the pot. If you choose to mount the species please care to ensure that you expose the roots, because growers often tend to cover the entire roots with moss - this is not correct. Proper mounting is to put a wad of moss beneath the roots and then tie it with twine or fishing tackle and then hang the mount.

If the plants are to be grown in pots which is also a good option, especially in Bangalore conditions, one has to be careful with the media used and the watering. Earlier we used brickbats and charcoal for media, now this has changed to CHC and pine bark which is available in market. As long as we were growing in inert material like brickbats and charcoal, the problem of over watering was not that much. With the use of organic material like CHC and bark, which tends to absorb and retain moisture (though good) the problem of overwatering arises. Mixing of charcoal and CHC and bark may be appropriate mixture for most of the Dendrobiums. One important point to be remembered when you pot dendrobiums is to stake the plant. This is very important for proper settling of the plant and its growth. Staking can be tying the plant to a stick and ensuring the stick does not move or wobble. Alternatively, the plant can be wired to the bottom of the pot or to the sides. While planting, ensure that the top portion of the plant is exposed and not buried in the media as the new growth comes from the lower sides.

It is important to mention that after the flowering of the species during the months of Feb- May, many of the species will have shed their leaves (deciduous) and then they will start putting out new growth from the bottom. Once this new growth starts, till it is about 3-4 inches give less water. Excess watering and too wet conditions may result in rotting of the new growth.

The new growth of the species starts with the flowering sometimes and sometimes after completion. Allow this growth to be little more than 3-4 inches then start fertilizing with high N, low P & K. This is the growth period and the plant needs more Nitrogen, this will go on from Feb – March to September. Once the period of hibernation is over and you see signs of new life like roots or leaves sprouting, start with a dose of seaweed extract, this should help the plant to wake up and put out new healthy roots and growth. The fertilizer concentration has to be weak and feeding is to be on a weekly basis. Once the canes/pseudo-bulbs pass the growth stage (by September), feed them with low nitrogen and high Potash for the matured growth. With the onset of winter though it is not so pronounced in Bangalore, some of the deciduous Dendrobiums will start shedding their leaves and shows indications of having attained maturity to produce blooms if the conditions are ideal. In its natural habitats, winter will be almost cool, dry with bit of moisture in the form of dew. They are exposed to sun during day and cool nights and dry conditions for almost 2-3 months which prime them for flowering. In the Bangalore winter temperatures will not go lower than 14-15 C and that too for few days only. Hence, unless some

of these plants are kept dry with watering once in 10 days, they will not initiate flower. However, inducing low night temperatures will be difficult, but keeping the plants in an open area rather than inside will subject them to some low temperature conditions. Thus, subjecting some of the dendrobiums from the North East to cool dry conditions at least for 4-6 weeks is important for their flowering.

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# STATUS OF ORCHID CONSERVATION IN INDIA: PART – III LEGISLATIVE MEASURES, *EX SITU* AND *IN SITU* CONSERVATION AND BIOTECHNOLOGICAL APPROACHES

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## CONSERVATION

With the realization of the depletion of orchid genetic resources, there have been consistent efforts to conserve them through,

- (1) Legislative measures of conservation
- (2) *In situ* conservation in Sanctuaries/Reserves.
- (3) *Ex situ* conservation in Orchidaria/Botanic gardens by cultivation.
- (4) Biotechnological approaches.

- **Legislative measures:**

As early as in 1936, Government of Assam prohibited unauthorized collection of *Vanda coerulea* (Blue vanda) and *Renanthera imschootiana* (Red Vanda), which are now included under, schedule VI of Wild life (Protection) Act 1972 of Government of India as amended in 1992. Accordingly, all orchids are protected plants under Wild life (Protection) Act.

The International Union for Conservation of Nature & Natural Resources (IUCN) has a Species Survival Commission (SSC) with a well-defined preservation program for the Convention on International Trade in Endangered Species of Wild flora and Fauna (CITES). Under this provision, orchids are now being treated as protected species. In India, three genera and eleven species have been treated as protected under Schedule –VI of Wild Life Protection Act 1972 and simultaneously under CITES Appendix –I.

All other species of India have been kept under Appendix II of CITES. Following are the genera and species under CITES Appendix –I and Schedule – VI of Wild life (Protection) Act of G.O.I.

(i) *Paphiopedilum charlesworthii* (Rolfe) Pfitz. (ii) *P. fairrieianum* (Lindl.) Stein. (iii) *P. hirsutissimum* (Lindl.) ex Hook ) Stein. (iv) *P. spicerianum* (Rchb.f.)Pfitz. (v) *P. insigne* (Wall ex Lindl. ) Pfitz. (vi) *P. venustum* (Wall ex Sims) Pfitz. (vii) *P. villosum* (Lindl.) Stein. (viii) *P.*

*wardii* Summerh. (ix) *P. druryii* (Bedd.) pfitz. (x) *Renanthera imschootiana* Rolfe (red Vanda) (xi) *Vanda coerulea* Griff. ex Lindl. (Blue Vanda).

Excepting *P. druryii*, which is reported from Kerala, all other species belong to N.E. India.

Under the provisions of the law, no wild orchids can be traded with and therefore plants listed above cannot be allowed for export. However, under CITES rules and regulations, whenever CITES Appendix –I species are cultivated then, these can be allowed for export subject to the condition that proper permit for possessing and growing these scheduled plants is obtained from the Chief Wild Life Warden (CWLW) of the State concerned and that the nursery is registered under Wild Life Preservation office, Government of India.

APPENDIX – I includes species threatened with extinction. In effect, no trade in Wild plants is allowed. Trade is allowed in cultivated and artificially propagated plants subject to licensing.

APPENDIX – II includes species, which may be threatened unless trade is strictly regulated. Orchidaceae is listed on Appendix – II. Trade in wild and propagated specimen is allowed subject to licensing. Further, all cultured orchid seedlings in flasks or aseptically cultured from seeds and tissues, are now exempt from CITES control *w. e. f.* 16<sup>th</sup> April 1993.

### **Biological Diversity Act 2002**

Government of India constituted a National Biodiversity Authority (NBA) at Chennai in 2003 with the aim of Conservation of biodiversity. The Biological Diversity Act, 2002 is formed for the conservation and sustainable utilization of biodiversity and for equitable sharing benefits arising out of the uses of biodiversity and its components.

### **Programmes**

As per the provisions of the Biological Diversity Act, 2002 and the Biological Diversity Rules, 2004 several programmes have been initiated in the States. The Biological Diversity Rules 2004 provide legal support for biodiversity conservation, protection of IPR and for the formation of State biodiversity Boards. State Biodiversity Boards have been constituted in majority of the States. Under the guidance of State Biodiversity Boards, local bodies at Panchayat/village levels can take up orchid conservation program and record the native orchid species in the People's Biodiversity Registers (PBRs). Both *In Situ* and *Ex Situ* conservation programs can be initiated along with promoting orchid based floriculture.

These legislations have helped in checking illegal collection of orchids from the wild as no importing countries also accept plants of wild origin. However, it is necessary to create awareness among customs Officials about these rules and train them on recognizing orchids of wild origin. In this regard, The Proceedings of the Seminar on CITES Implementation for Plants (1997), outlines and illustrates the method of recognizing the wild plants at the port and the procedure to deal with the same.

However, in order to conserve and effectively manage the orchids, there is a need for monitoring the status of individual species in their habitat by assigning number of individual species found in its natural habitat ecology. For instance, **The New York State Environmental Conservation Law (Section 9-1503)** assigns a legal status to plant species based on their abundance. According to this law, **“it is a violation for any person, anywhere in the state to pick, pluck, sever, remove, damage by the application of herbicides or defoliant, or carry away, without the consent of the owner, any protected plant.”**

**NY State Legal Status codes are as follows:**

- E:** Endangered species, listed species are those with 5 or fewer extant sites, or fewer than 1,000 individuals, or restricted to fewer than 4 USGS 7.5 minute topographic maps, or species listed as endangered by the federal government.
- T:** Threatened species, listed species are those with 6 to fewer than 20 extant sites, or 1,000 to fewer than 3,000 individuals, or restricted to not less than 4 or more than 7 USGS 7.5 minute topographic maps, or species listed as threatened by the federal government.
- R:** Rare species, listed species are those with 20 to 35 extant sites, or 3,000 to 5,000 individuals state wide.
- V:** Exploitably vulnerable, Listed species are likely to become threatened in the near future throughout all or a significant portion of their range within the state if causal factors continue unchecked.

Such initiative would help manage and conserve orchid diversity in an effective manner in each State of our country.

- ***In situ* conservation in Sanctuaries/Reserves.**

Although 4.5% of the total geographical area of our country is covered under the Wild life Protected Area (PA) network (Hegde, 1997) covering some important orchid habitats, there are number of endangered and threatened orchids that occur outside these PA network. For instance, most of the endangered, threatened orchids including *Vanda coerulea*, *Renanthera imschootiana*, most of the species of *Paphiopedilum* occur outside Wild Life Sanctuaries and Reserves. Hence, there is a need for identifying such habitat areas of endangered orchids and create orchid Sanctuaries and reserves for conservation of this unique group of plants. Arunachal Pradesh has pioneered in this direction by creating “Sessa Orchid Sanctuary” with 100 Sq. km. area in West Kameng District under Wild Life Protection Act which is an abode of about 200 species that include some of the endangered and endemic species like *Paphiopedilum fairrieianum*, *Galeola lindleyana*, etc (Hegde, 1986). In Kerala, natural habitat of *Paphiopedilum druryii* in Agsthyamalai Hills has been declared as Sanctuary for protecting this unique endemic orchid. Similar Sanctuaries have also been created in Sikkim at Deorali and Singtam and such efforts are needed in all other States of India.

### 3. *Ex situ* Conservation in Orchidarium/Botanic Garden by cultivation

In India, Botanical Survey of India is maintaining three National Orchidaria and Experimental gardens one each at Yercaud in Tamil Nadu, Howrah in West Bengal and at Shillong in Meghalaya where representative species of the region are cultivated. Besides, BSI is maintaining germplasm collection in Andaman & Nicobar Islands, Dehra Dun, Pune and Sikkim. Similarly, Arunachal Pradesh State Forest Research Institute is maintaining large number of orchid species at Orchid Research Centre Tipi, Itanagar, Sessa, Dirrang, Jenging and Roing as a measure of *ex situ* conservation of orchids and also for breeding and improvement. Similar attempts have also been made by Mizoram, Meghalaya, Manipur, Nagaland and Sikkim. Other states like Assam, Tripura, West Bengal, Orissa, Kerala and Tamil Nadu are also making efforts in this direction. Tropical Botanical Gardens and Research Institute (TBGRI) Trivandrum in Kerala has been maintaining good germplasm collection. National Research Center (Orchids), ICAR, Sikkim has been maintaining large number of orchid species and undertaken conservation and research. In Karnataka, three *ex situ* conservation Centers have been established one in Kodagu at Nisargadhama, another in Kudremukh and the third in Dhandeli (Rao, T.A. & Sridhar 2007). A natural Orchidarium for the conservation of orchid germplasm has also been planned in Bangalore within Lalbagh Botanical Garden. As a private initiative, about 300 species of orchids have been maintained in the Wayanadu Botanical Sanctuary, Kerala. In Manipur, an Orchid Research and Development Center has been established for the conservation and sustainable utilization of Orchid resources for the welfare of the community and have about 300 native orchid species under cultivation.

With the depletion of natural forest day by day, numbers of orchids are lost forever. In order to conserve these bio-resources it must be ensured that orchids from forest areas likely to be cleared for other developmental purposes are shifted to safer places like orchid Sanctuaries and Orchid Centers where they could be cultivated and maintained. It must be ensured that necessary provisions are made in the Environment Impact Assessment (EIA) to that effect, to ensure *ex situ* conservation for orchids. Besides, the Program of *Ex Situ* Conservation in Botanical Gardens by the Ministry of Environment & Forests, GOI, Schemes for strengthening the Botanic Gardens have been promoted throughout the country. Such schemes should be made use of for conserving and managing the biodiversity of orchids in India.

- **Biotechnological Approaches:**

Aseptic culture technique of seed germination and tissue culture is a handy tool for mass propagation of orchids (Knudson 1946, Morell 1960). In India, significant works have been done by various workers in standardizing protocols of large numbers of species & hybrids using embryos, seeds, apical shoot meristem, axillary bud explants, flower stalk nodes and root tips (Hegde 1991, 1998, 2001, 2002a, 2002b, Hegde & Ingalahalli 1986, Hegde & Sinha 2002, Shadang & Hegde, 2006, Shadang, *et al.* 2007, Sinha & Hegde 2002, Sinha, Singh & Hegde, 2002, Vij 1986, 2001). Technique of encapsulation of seeds (Beeds) for long storage, cryopreservation, and hardening of micro propagated seedlings have paved a way for applying

the biotechnological approaches in conserving the gene pools and threatened species of orchids (Hegde 2002, Pathak *et al* 2001, Vij *et al* 1992). Now, there is a need to take the results of such research findings to effectively propagate and rehabilitate the threatened and ornamental orchids of India in a systematic manner as a measure of conservation.

### **Awareness Campaigns & Role of NGOs:**

Common man in Indian villages who is the primary stake holder of the biodiversity in his surroundings, especially in the “Hot Spot” areas is not aware of the importance of orchids, nor is he concerned about the conservation of orchids in particular. He is concerned about his livelihood first. It has been observed, the villager in the Northeast region often seen selling the wild orchids – plants & flowers in the nearby cities at throw away prices without knowing State laws and its implications. Even some Orchid Nurseries in this region are engaged in selling and exporting the native species without following the State laws. Authorities concerned are also not aware of the same. Hence, it is necessary to create awareness among the cross sections of the society on these issues and it is the prime duty of the elite society and the scientists who know the importance of orchid resources and implication of destruction of habitat, to make them aware of conserving the natural heritage present in their surroundings.

Sincere efforts should be made in implementing the provisions of the Biological Diversity Act-2002 of GOI, to constitute local Biodiversity Management Committee (BMC) at Village Panchayath, Block Panchayath and District Panchayath levels and maintain “People’s Biodiversity Register” with separate chapter on Orchids. The purpose of this is to promote Conservation & sustainable use, documentation of orchid diversity including preservation of habitats, conservation of land races and microorganisms and documentation of ethno botanical knowledge relating to orchids. Preparation of biodiversity register also forms a major activity of BMCs.

Institutions like NRC Orchids and the Botanical Survey of India should provide technical support in the preparation of Orchid diversity registers at various levels and help in managing such registers systematically by imparting training to government officials and villagers. Technical Monitoring Committee will monitor the preparation as well as management of PBRs. The progress of activities should be examined at ward level in every three months. Similarly, monitoring should also be done at District and Block levels in every six months.

However, what is important is creating awareness by the public for conserving these unique plants for posterity. In this regard, various Universities, Colleges and Schools should involve themselves in this cause for creating awareness by introducing orchids in school and college curriculum. Every Botanic Garden in our country must have an Orchidarium representing the locally available orchid species. Activities under Agri-horticultural and Orchid Societies also would help in creating mass awareness and train the students and public in the science and art of orchid cultivation. Further, it would be worthwhile considering propagation of orchids by adopting biotechnological means through aseptic culture of seeds collected from various species of orchids and rehabilitate them in their habitat / sanctuaries and encourage local people and the

hobbyists to cultivate them in their home garden. This would ensure conservation of our germplasm *ex situ*.

## CONCLUSION

India is rich in orchid diversity with about 1350 species in 186 genera. Due to various causes of development and over exploitation, they are threatened of their existence in the wild. There is a need to develop a scientific data base on the distribution and the threat status of orchids based on the IUCN guidelines. Proper procedure for developing this data base having knowledge on orchid systematic and survey based on population density of each species along with notes on their habitat requirements and threat status should be developed and implemented. National Register of Orchid diversity should be developed and prioritizing the conservation needs of threatened species, following the various measures of conservation in tune with national and international laws. Biotechnological approaches should be adopted in propagation, rehabilitation and conservation of threatened species and monitor their survival periodically. Creating awareness among the public on the importance of conservation and the National Laws pertaining to the same should be undertaken at various levels of the society from rural to urban areas involving the government agencies, NGOs, Universities, Research Institutions and local communities throughout the country.

## REFERENCES

- Abraham, A. & Vatsala, P. 1981. Introduction to Orchids. TBGRI, Trivandrum.
- Anon. 1997. CITES Implementation for Plants. *CITES Manual*. CITES Secretariat / UNEP.
- Bruhl, P. 1926. A Guide to the Orchids of Sikkim. Calcutta.
- Champion, H. G. & Seth, 1968. A Revised Survey of the Forest Types of India. Government of India Press, Nasik.
- Chowdhery, H. J. 1998, Orchid Flora of Arunachal Pradesh. Bishen Singh Mahendra Pal Singh. Dehradun.
- Cooke, T. 1908. Flora of the Presidency of Bombay. 2.: 672-723. London.
- Deva, S. and H. B. Naithani. 1986. The Orchid Flora of North-West Himalaya. New Delhi.
- Anon. 2003 & 2013. Phytogeographical Distribution of Rare, Endangered, Threatened and Endemic Taxa of India. *ENVIS*, BSI, MoEF, GOI. New Delhi.
- Gamble, J. S. 1928. Flora of the Presidency of Madras. London.
- Ghatak, J and Devi, RKJ. 1986. Orchids of Manipur. In: *Biology, Conservation & Culture of Orchids*. Ed. Vij, S.P., East-West Press, New Delhi.
- Ghose, B. N. 1953. Beautiful Indian Orchids & How to Grow Them. Ghose & Co., Darjeeling.

- Hegde, S.N. 1981a. Cultivation and Conservation of 'Lost Orchid'. *Indian Horticulture*, 24(4): 7 - 9.
- \_\_\_\_\_. 1984. Orchids of Arunachal Pradesh. Forest Department, Arunachal Pradesh. Itanagar.
- \_\_\_\_\_. 1986. Role of Orchid Sanctuaries in conservation in India with reference to Orchid Sanctuary, Sessa, Arunachal Pradesh. In: *Biology, Conservation & Culture of Orchids*. Ed. S.P.Vij : P 387-396.
- \_\_\_\_\_. 1991. *Paphiopedilum venustum* (Wall.) Pfitz. Ex Stein – a new addition to Arunachal Pradesh. *Arunachal Forest News*, 9(2): 11 – 16.
- \_\_\_\_\_. 1991. Orchids from Lab to Field in Arunachal Pradesh. *Arunachal Forrester News*, 9(1): 23 – 37.
- \_\_\_\_\_. 1997. Orchid Wealth of India. *Proc. Indian Natn. Sci. Acad. B63 No. 3 pp 229-244*.
- \_\_\_\_\_. 1998. Twenty-five Years of Orchid Research & Development in Arunachal Pradesh. In: *Orchids: conservation, culture, farming and trade*. Ed, Hegde, S. N., OSA, Itanagar. Himalayan Publishers, Itanagar/New Delhi.
- \_\_\_\_\_. 2000. Orchids of North-East India: Conservation and Export Potential. In: *Natural Resources, Conservation and Management for Mountain Development*. Eds. S. C. Tiwari and P. P. Dabral, 91 – 154.
- \_\_\_\_\_. 2001. Orchids: Conservation, Culture, Farming and Trade. OSA, Itanagar. Himalayan Publishers, Itanagar/New Delhi
- \_\_\_\_\_. 2002. Conservation & Sustainable Use of Bio Resources Through Biotechnological Means. In : Arunachal Pradesh. In: *Himavikas Occasional Publication No. 16*. Ed. Sunderial, et al. P. 289 – 299.
- \_\_\_\_\_. 2002. Prospects of Floriculture Industry in Arunachal Pradesh and other parts of Northeast India with special reference to Orchids. In: *Resource Management Perspective of Arunachal Agriculture. Chapter 3*: 17-30. Ed. K. A. Singh. ICAR, NEH Region, Basar, A.P.
- \_\_\_\_\_. & Sinha, S. K. 2002. Conservation of Rare and Endangered Vandaceous Orchids adopting Biotechnological Approaches. In: *Role of Plant Tissue Culture In Biodiversity Conservation and Economic Development. Chapter 6*: 521-530. Eds.S. K. Nandi, LMS Palni &A. Kumar. G.B.Pant Institute for Himalayan Environment & Development. Almora.
- \_\_\_\_\_. 2005. Orchid Diversity in the Eastern Himalayas. *Journ. Hill Research*. 18(2): 43-54, 2005.
- \_\_\_\_\_. 2007. Orchids of Uttara Kannada District, Karnataka and Their Conservation. *Orchid Newsletter*: 2(3): 9 – 22.

- \_\_\_\_\_. 2012. *Ex Situ & In Situ Conservation of Orchids of India*. *J. orchid Soc. India*, 26(1 & 2): 1 – 4.
- Griffith, W. 1851. *Icones Plantarum Asiaticum*. III. Calcutta.
- Hooker, J. D. 1990 & 1994. *Flora of British India, Vols. 5 & 6*. Ashford Kent: Reeve & Co.
- Jain, S. K. & Sastry, A. R. K. 1980. *Threatened Orchids of India: A State-of-the-Art Report*. B.S.I., Howrah.
- Jain, S. K. & Mehrotra, A. 1984. *A Preliminary Inventory of Orchidaceae in India*. POSSCEF, BSI, Howrah.
- Jagadeep Verma. 2013. *Orchid Flora of Himachal Pradesh: History and Composition*. In: *Proc.National Deialogue on Orchid Conservation & sustainable Development for Community Livelihood*. NRC orchids, Pakyong, Sikkim. Pp. 131.
- Jalal, J. S. 2007. *Orchids of Uttaranchal: A Plea for Conservation*. *MIOS Journ.* 8(10): 11-14.
- Joseph, J. 1982. *Orchids of Nilgiris*. Records of the Botanical Survey of India. Vol.22. Howrah.
- Kataki, S.K., Jain S.K. & Sastry, A.R.K.1984. *Distribution of Orchids of Sikkim and Northeast India*. *Plant Conservation Bulletin-5*. BSI, Howrah.
- Kataki, S. K., 1986, *Orchids of Meghalaya*, Forest Department, Shillong.
- Kataki, Ss. K. & Hynniewta, T. M. 1986, *Orchids of Nagaland*. In: *Biology, Conservation and Culture of Orchids*, Ed. Vij, S. P., p. 351-56. East-West Press, New Delhi.
- Kaushik P. 2013. *Therapeutic Value of Indian Orchids*. In: *Proc.National Deialogue on Orchid Conservation & sustainable Development for Community Livelihood*. NRC Orchids, Pakyong, Sikkim. Pp.48-49.
- King, G. & Pantling, R. 1898. *The Orchids of Sikkim Himalayas*, *Ann. Roy. Bot. Gard.* Calcutta, 8 - 342.
- Knudson, L. 1946. *A new nutrient Solution for the germination of Orchid Seeds*. *Am. Orchid Soc. Bull.* 15: 213 – 217.
- Lindly, J. 1857. *Contributions to the Orchidology of India*. *Linn. Soc. Bot. J. 1*: 170 – 90.
- \_\_\_\_\_. 1858. *Contributions to the Orchidology of India*. *Linn. Soc. Bot. J. 3*: 1 – 63.
- Manilal K.S. & Sathish Kumar, C. 2004. *Orchid Memories – A Tribute to Gunnar Seidenfaden*. IAAT, Calicut.
- Muktesh Kumar, M. S. 1998. *Studies on the Epiphytic Flora in the Tropical Ecosystem of Western Ghats with reference to Nilgiri Biosphere Reserve*. KFRI, Peechi. Pp.71-128.
- Misra, S. 1989 (1990). *Orchid Flora of Orissa*. *Journ. Orchid Soc. India*, 3 (1-2): 61-72.

- Misra, S. 2007. Orchids of India – A Glimpse. Bishen Singh Mahendra Pal Singh, Dehradun.
- Morel, G. M. 1960. Producing Virus - free Cymbidiums, *Am. Orchid Soc. Bull.* 29: 495 – 97.
- Mayar, M. P. and A. R. K. Sastry. 1987-1990. Red Data Book of Indian Plants. *Vol. I, II, & III.* Calcutta.
- Rao, T.A. & Hegde, S. N. 2006. Biodiversity of Orchids in the Western Ghats: Their *in situ* and *ex situ* Conservation for Sustainable Development. *In: Proc. National Seminar on Plant Resources of Western Ghats: Ecology, Economics and Conservation.* Karnataka Biodiversity Board, Bangalore.
- Rao, T.A. & Sridhar, S. 2007. Wild Orchids of Karnataka – A Pictorial Compendium. INCERT, Bangalore.
- Rao, A. N. 2013, Additions to Orchidaceae of N. E. India and an Update analysis and Classification. *In: Proc. National Dialogue on Orchid Conservation & sustainable Development for Community Livelihood.* NRC Orchids, Pakyong, Sikkim. Pp. 1.
- Rao, A. N. 2014. Orchid Diversity in Northeast India with Special reference to Medicinal and Ornamental ones and their Conservation. *In: Souvenir of National Symposium on Gene Conservation of Medicinal and Horticultural Orchids of the North-eastern Region and their Sustainable Use through Community participation.* Pp. 2-12.
- Santapau, H. & Kapadia, S. 1966. Orchids of Bombay. GOI, New Delhi.
- Sathish K. C. & Manilal, K. S. 1992. Epiphytic Orchids of India, *Rheedea*, 2: 80 – 100.
- Sathish K. C. & Manilal, K. S. 1999. Orchids of Silent Valley. *In: Silent Valley- Whispers of reason, Ed.* Manoharan, Biju, Nayar & Easa, Pp. 129-133.
- Shadang, R. & Hegde, S.N. 2006. In vitro Seed Germination and Microropagation Studies in *Ascocentrum ampullaceum*(Roxb.)Schltr.(Orchidaceae), *In: Horticulture in Sustainable Income and Environmental Protection, Ed.* Singh, Sema & Alila, Concept Publishing Company, New Delhi.
- Shadang, R., Dwivedi, P, Hegde, S. N., Ahmed, N. 2007. *Indian Journal of Biotechnology*, 6: 256-261.
- Seidenfaden, G. & Arora, C. M. 1982. An Enumeration of Orchids of Western Himalaya. *Nord. J. Bot.*, 2: 7 – 27.
- Singh, D.K., Wadhwa, B.M. and Singh, K.P. 1990. A Conspectus of Orchids of Mizoram: Their status and Conservation. *Journ. Orchid Soc. India.* 4: 51d-64.
- Singh, D. K. 2001. Orchid Diversity in India. *In: Orchids: Science & Commerce.* Bishen Singh Mahendra Pal Singh, Dehradun; Pathak, P., *et al*, 2001, p.15 – 65.
- Singh, D.R., Baskaran, V. & Roy, S. D. 2013. Orchid Diversity in Islands: Challenges and Prospects. *In: Proc. National Dialogue on Orchid Conservation & sustainable Development for Community Livelihood.* NRC Orchids, Pakyong, Sikkim. P. 9.

- Sinha, S. K & Hegde, S. N. 2002. In vitro morphogenetic response of inflorescence segments of *Aerides rosea*: reversion to vegetative growth. In: *Role of Plant Tissue Culture in Biodiversity Conservation and Economic Development*. Ed: Nandi, S. K., L. M. S. Palni and Kumar, A., pp.237-244.
- Sinha, S.K., Singh, S.L. & Hegde, S. N. 2002. Effect of Nutrient Concentrations on *in vitro* growth and differentiation of protocorm like bodies of *Renades Arunodaya*. In: *Role of Plant Tissue Culture in Biodiversity Conservation and Economic Development*. Ed: Nandi, S. K., L. M. S. Palni and Kumar, A., pp. 229-236.
- Vij, S. P. 1986. *Biology, Conservation and Culture of Orchids*. East-West Press, New Delhi.
- Vij, S. P. 2001. Orchidology in India: Current Status. In: *Orchids: conservation, culture, farming and trade*. Ed, Hegde, S. N., OSA, Itanagar. Himalayan Publishers, Itanagar/New Delhi. Pp. 1 – 13.
- Vij, S.P., Pathak, P and Kaur, P. 1992. ‘Synthetic Seeds’ and their utility in orchid propagation. In: *Proc. Chandigarh Symposium on New Biology*. Chandigarh, India.
- Roxborough, W. 1832. *Flora Indica*, London, Allen & Co.

## ORCHID 'HUNTING'

K S Shashidhar

Orchid 'hunting', you must be wondering about the terminology used! yes, it refers to searching of orchid plants in wild or in its natural habitat for the purpose of collection or for commercial purposes. The demand for these wild plants was there and is still there. Orchids are one of the few plants to which you get addicted very soon. As the saying goes, "***You can get off alcohol, drugs, women, food, and cars, but once you're hooked on orchids, you're finished. You never get off orchids....never.***" - **Joe Kunisch, commercial orchid grower**. Having mentioned this, in the earlier days interested people started collecting orchids mainly for growing as they were fascinated by these wonderful tropical plants. There have been several instances during the British times in India, as they were so fascinated by these tropical plants they started collecting in loads and sending it England and other places without actually knowing how to grow and nurture them. In fact, some of them thought as these plants grow in tropical climate, they require plenty of humidity, and started growing them in kind of steam house (though humidity was there the temperature was high) and resulting in losing all the plants (mind you loads of them).

This apart, let us see some of the fascinating stories about Orchid Hunting and why people are known to take so much of risk, often losing their lives while collecting, is it the monetary part or is it the passion for the unique flower and want to be the first owner and often the only owner of that species? Probably we will have some answers by the end of this article after going through some interesting instances narrating how far people go for want of orchids.

Probably how it all started was, with its exclusive and interesting flowers, orchids have attracted the growers and over a period of time, the growers started collecting one after another of this wonderful plant. Then there was no stopping them, and with this the addiction and then the 'hunting'. The hunting then was for rare ones and rain forests and tropical forests all over the world was the hunting place for the collectors.

Few narrations will explain in a better way as how this 'hunting' started and continued. Let us look at some of the stories. During 19<sup>th</sup> century, plant hunting was at its peak. In the British India, in 1835, the Duke sent John Gibson, to Chirrapunji in the Khasi hills range (in the present Meghalaya) and he in turn shipped 80 new species of orchids and returning home after two years.

Sanders had many explorers with the sole objective of procuring orchids. One such explorer Roebelin was sent to Philippines in 1882 in search of new species. He was guest of one of the chieftain's and he was accommodated in a tree house perched on a high canopy so that he can be away from wild animals. Early morning earth quake destroyed the tree house and threw all his companions to the ground. When he woke up and saw through the damaged roof, he could see some beautiful lilac and cinnamon colored flowers. He climbed and collected the same and later named as *Vanda sanderiana*.

In another instance, a group was searching for a rare orchid and spent nearly two months looking for this by camping in remote area. They searched for several weeks without any success and decided to move, then under the waterproof tent they were camping lay the orchid they were looking for beyond salvation.

Instances have been reported that the famous Andean forests were literally ripped and destroyed all for this exquisite orchid flower. In search of these orchids dwelling amidst the dense foliage in different stories of canopy, forests were destroyed. On the other hand, just to ensure that the particular orchid species does not go into the hands of competitors, the forests were destroyed, often burnt. This type of 'hunting' resulted in the species becoming more precious and valuable with those who procured it first as others have no possibility of getting it. In fact, it is difficult to understand the mindset of the explorers whether the purpose was for scientific conservation or commercial or more of passion to procure newer species or just their whim. As a result, several people have laid down their lives in search of orchids. Several well-known personalities in pursuit of this addicting plant, have either got killed or died due to various illness. In addition to loss of lives, the herbaria which has been collected at great risks were also lost due to local fights, burning down, wars etc. Looking back now, one can see what a great loss it was and never to be recovered and lost forever!!!

Henry Frederick Conrad Sander (well known as Sander) is a German born orchidologist settled in England. Sander joined Benedict Roezl a plant collector and subsequently set up his own orchid business and at one time engaged 23 orchid collectors to search for orchids in Asia and South America.

Competitive secrecy was the key for the collectors who do not share what they are looking for and do not discuss about orchids. Once the initial discovery of numerous species is done with, there will be search for new species and secrecy was the key word. In the earlier period, competition amongst the collectors was so great it was essential to maintain utmost secrecy. Wilhelm Micholitz a German plant collector engaged by M/s Sanders company summarizes the arduous expeditions he underwent to collect orchids and finally says,

*"I do not know what I would not give to be back in the well-ordered British or Dutch Colonies in the East, to be able to do work in peace and comparative comfort".*

One of his famous discoveries *Dendrobium phalaenopsis* var. *schröderianum* and along with other species while he was transporting it to England, the entire consignment caught fire and destroyed. When he informed this mishap to Sanders, he was instructed to RETURN AND RECOLLECT, which he did eventually and in the process introduced this wonderful species to the green houses in England.

As a plant hunter Benedict Roezl was a totally different kind of person, often careless and lacking in judgement, his interest was only to discover new species and he did not bother about its preservation, shipping etc, He was not known to carry any fire arms and used to travel at the mercy of the locals. He was often robbed of his belongings which he never cared.

Although any new orchid species discovery retains its fascination even today, but it is not what it was in nineteenth century when any new species discovered made headlines. During this period, orchid collection and growing was considered to be an expensive hobby for wealthy people and at times even now the same belief carries. Of course, definitely the plants are expensive when compared to other flowering plants. The demand for this fascinating plant increased during the 19<sup>th</sup> century resulting in collectors being engaged to strip orchids from the tropical forests in truck loads only to be exported to Great Britain.

During this period (19<sup>th</sup> century) the main objective was to collect this wonderful flowering species or one can say scoring the jungles and steep mountains and strip the forests of these orchids and ship it to Europe to be sold for a handsome profit. While doing so, he would literally strip the areas devoid of any orchids lest it will fall into the competitor's hands. As they say nature will have its own way of getting back at people who ravage it mercilessly, it took toll of the 'hunters' by different means. Many of them got killed and lost their lives by falling off a cliff and killed by some wild animals or captured by locals. In addition, shipping these orchids was a major problem that, many of them were destroyed either due to fire or some pests and diseases attack or ship wreck and hardly some will have reached at times.

If one looks back, monetary gains was the major for many of them, Sander made a fortune from the sale of these orchids after funding these expeditions and getting some of the most valuable and very interesting species those days. Of course, the risks were great in such expeditions but the returns were supposed to be mind boggling. Orchids were sold like jewels at a high price. It was reported that at the peak period, Sander made something like 2000 pounds by selling one plant of *Cattleya warscewiczii* f. *sanderiana*.

#### Twenty First Century

The story of orchid hunting continues in a different pattern. Although the legalities and plenty of rules and regulations have deterred collectors from venturing into tropics in search of new species for commercial overtures, the search and zeal for discovering new orchid species is still on and collectors are still fascinated by this venture.

Few stories come to my mind in the present scenario, but the main one is the recent discovery of *Phragmipedium kovachii* from the jungles of North East Peru in the year 2002. According to John Beckner from the Marie Selby Botanical Gardens of Sarasota, Florida, *Phragmipedium kovachii* is 'the most spectacular, the most sensational, the most incredible looking orchid in 100 years or more'. There was an urgency to describe this species by the Botanical gardens of Florida immediately after a month of discovery of the species by James Michael Kovach in May 2002, as they thought such a spectacular species will not have gone un noticed and there may be others waiting to describe, such is the competition even now as far as orchids are concerned. Yes, they were right as Eric Christenson of AOS was ready to describe the species. The story goes further with Eric Christenson claiming that *P. kovachii* is a prohibited name!!! After that by June 20<sup>th</sup> of 2002, the Peruvian Government asked the US authorities to check and investigate the

*P. kovachii* issue as they say the plants were taken from Peru without proper permits and also the genus *Phargmipedium* is under CITES.

Subsequently after two years Michael Kovach received a two-year probation and was fined 1000 \$ for collecting a new species illegally and describing it. This is just to highlight to what extent things can go in Orchid Crazy world. Further, efforts were made with a proposal to declare the name *P. kovachii* as invalid before Nomenclature Committee in 2006, however, it was declined. It is a different story altogether that the species has become very popular and is in cultivation with several hybrids. The price for the species range from 250 – 450 US \$. Several of its hybrids also command good price ranging around 100 US\$. Here again, the point is the species made name more for its controversies and story behind it rather than the beauty of the plant. This again highlights the greedy world of orchids and as they say, the orchid fever is not a legend, it is very much there.

Several orchids still command very high price such as Gold of kinabalu – *Paphiopedilum rothschildianum* with its natural habitat in the Mount of Kinabalu region of Malaysia with its rarity and beauty commanded as much as 6000 US \$ apiece at some point of time. This orchid is only native to Kinabalu NP in Malaysia and is protected by Malaysian Government. This was discovered in the year 1987 and the it flowers in a certain area of the slopes of Mt. Kinabalu between 500-1200 M altitude. All these makes it an ideal material for black marketing at a price of up to US dollars 5000 per stem. Often the flowering will take as much as 15 years. Even in its natural habitat it is very difficult to find the plant.

The narrations and the adventures and the expeditions in search of a new species over decades is plenty. During earlier period (19<sup>th</sup> century) when orchids were not well known, the commercial angle drove the collectors and the funding people or companies to make as much profit as possible from this wonderful flowering plant. The angle was clearly making profit. But at the same time, what is to be appreciated is several of these unknown orchids after discovery reached many greenhouses for cultivation all over the world. It also paved way for multiplication and hybridizing which in a way has indirectly helped the cause of conservation of orchids in its natural habitat. Though the number of new species discovered has come down, but still every year new species is being discovered and as late as in 2017, few orchids such as

*Telipogon diabolicus* - known as the devil's in the details, Location: Colombia,  
*Gastrodia nipponicoides* and *Gastrodia okinawanesis*, Location: Okinawa, Japan  
About 11 new species have been discovered in Sabah recently.

With the passage of time, the extent of discovery came down and whatever was discovered was treated as an achievement. By then not only people became aware of the importance of orchids and its conservation and due legal provisions ensured that illegal collection and export were brought down. Several countries and regions within the country prohibited collection of orchids unless it is permitted for scientific studies and for other valid reasons. But having said all these,

orchid collection and discovery in wild still attracts many despite the adversaries in terms of places, legal provisions.

References:

- Anon. Orchid Hunters- Sanders Orchids  
<https://www.sandersorchids.com/sanders-orchids/the-orchid-hunters/>
- Jorge Mario Munera. Twelve Portraits of the Dracula Orchid, A Photo-essay  
<https://revista.drclas.harvard.edu/>
- Orchid Hunters, tales of mystery & intrigue – The North England Orchid Society  
[www.orchid.org.uk/orchidhunters.htm](http://www.orchid.org.uk/orchidhunters.htm)
- The Orchid hunters opens 13 February in the Glasshouse Range  
[www.botanic.cam.ac.uk/Botanic/NewsItem](http://www.botanic.cam.ac.uk/Botanic/NewsItem)
- Victoria Zemlan. By Hook or Crook : The plunder of orchids from the New World.  
[www.lewisginter.org/by-hook-or-by-crook-the-plunder-of-orchids-from-the-new-wo](http://www.lewisginter.org/by-hook-or-by-crook-the-plunder-of-orchids-from-the-new-wo).
- *Phragmipedium kovachii*: beauty and controversy. A Garden's Chronicle.  
[carnivorousockhom.blogspot.com/2014/02/phragmipedium-kovachii-beauty-and.html](http://carnivorousockhom.blogspot.com/2014/02/phragmipedium-kovachii-beauty-and.html)

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## Colors of the Orchid World

Sriram Kumar

Orchids are most popular and fascinating group of plants, which naturally occur in many colors, variations and fragrances. Sometimes, same species naturally occurs in multiple colors with different sizes as natural variations.

Some of the orchid species are also named based on their primary color in wild and natural variations in color are given different form names based on their color.

Latin Name	Description	Example
Alba/Album/ Albus/Albo	White	<i>Aerangis luteo alba</i> , <i>Cattleya violacea f. alba</i> , <i>Dendrobium albosanguineum</i>
Semi-Alba	White flowers with a colored lip	<i>Cattleya violacea f. semi-alba</i>
Flava/Flavus/Flavum	Yellow	<i>Phaius flavus</i> , <i>Vanda tessellata f. flava</i>
Coerulea	Blue	<i>Vanda coerulea</i>
Rubra/Rubrum	Red	<i>Laelia purpurata var. Rubra</i>
Viridis	Green	<i>Chiloschista viridiflava</i>
Lutea	Yellow	<i>Aerangis luteo alba</i>
Atro/Atrum	Dark/Black	<i>Cymbidium atropurpureum</i>
Fusco/fuscus	Dark	<i>Phalaenopsis fuscata</i>
Rosea/Roseum	Rose	<i>Calanthe rosea</i>
Lilacina	Lilac colored	<i>Vanda lilacina</i>
Vini Color	Wine colored	<i>Paph. delenatii f. vinicolor</i>
Violecia	Violet colored	<i>Phalenopsis violecia</i>

Sanguinea/Sanguineum	Blood Red	<i>Broughtonia sanguinea</i> , <i>Dendrobium albosanguineum</i>
Purpureum/Purpurata	Purple Color	<i>Dendrobium purpureum</i> , <i>Laelia purpurata</i>

\*alba form name sometimes is also referred to lack of red/maroon pigmentation (Albino)

Latin is a gender specific language and endings of a word could be different based on the gender of the word.

Gender	Ending	Example
Feminine	Alba	Genus ends with "a", "is", "es", "e", "ix", or "ys" it is feminine (Vanda, Renanthera, Airedes)
Masculine	Album	Genus ends with us, er, or ir
Neutral	Album	Genus that ends with um, like Oncidium, Dendrobium, or Paphiopedilum

### **Is color a variety or a form?**

Variation: A variation (var.) epithet distinguishes between the typical appearance of the species and a variation within the species. A variation has significant horticultural differences from the typical species, such as growth habit or size for example, and is only found in a fraction of the general population. Variations are not limited to a distinct geographical area. Just as a species is a more distinct description than a genus, a variety is a more distinct description than a form.

Form: A form (f.) epithet distinguishes between the typical appearance of the species and sporadically occurring mutations that can sometimes be found within the broad population of the species. A form is often used to denote color variations (the alba form for example). For example, *Euanthe sanderiana* f. alba is a white (or white and green) version of the species. The epithet (alba) is italicized but the abbreviation “f.” for form is not. It is pronounced “the alba form of *Euanthe sanderiana*.” (For some reason Kew has decided not to recognize these var./form definitions as accepted names, but it is still widely used among growers as the attributes are definite selling points and as a buyer I would definitely like to know what form I am actually getting)

**answer to the question is Color is a form ?**

## **V.T. BALANARASIMHA – A BANKER BECOMES AN ARDENT ORCHID HOBBYIST**

Mesmerizing beauty of orchids with their curious shape and attractive colour of flowers has attracted millions of people world over. It has become a great hobby and an industry of orchid plants & flowers with multimillion dollars across the world. Urban dwellers especially adore these plants and grow them in their homes as a satisfying hobby adding beauty to their homes. Bangalore is no exception and Mr. Balanarsimha, is one such bangalorean who fell prey to the charm of orchids – and today he is an ardent orchid hobbyist.

Recognizing his interest & love for orchids in the regular meetings of TOSKAR, we paid a visit recently to Balanarasimha's rooftop Orchid Garden. From a distance only, we could see the Orchid house on the rooftop and it was easy to locate his house in Girinagar, Bangalore. We were warmly welcomed by both Mr. Balanarasimha and his wife, Smt. Padmavathy. Over a cup of coffee and Rava idli – chatney, we had lively conversation on orchids and their life around it. The couple live alone in Bangalore while the children & grand children reside in USA.

During the conversation while climbing staircase to their rooftop Orchid Garden, we could know that Mr. Balanarsimha is a Graduate in Agricultural Sciences (1974) from the University of Agricultural Sciences, Bangalore and subsequently worked in Canara Bank as an Officer. He took voluntary retirement in March 2001. Thereafter, for the last sixteen years, he has been doing Financial Consultancy and Insurance Business.

Then, Lo... Orchid Garden on the rooftop!!! Full of orchids; many in blooms, quite exciting!!!

Let us try to know more about them from the proud owner of Orchids, as our conversation – questions & answers continued.

**Q:** What prompted you to take up orchid growing?

**A:** It was one Mr. Kiran, a software engineer (who lived near our house) and a member of TOSKAR, introduced me to orchid growing about 7 years ago at Indo-American Hybrid Nursery at Jayanagar. I purchased a Dendrobium orchid there and started growing it. Kiran told me also about the activities of TOSKAR. To know more about orchids, I became a member of this Society six years ago. My interest grew; I became crazy. I started adding orchids to my collection.

**Q:** As on today how many orchids you have?

**A:** I have about 350 orchid plants – both hybrids & species. To tell you exactly: a. Phalaenopsis Hybrids 37 and 1 species; b. Dendrobiums - 95 Hybrids, 43 species; c. Cattleyas 41 Hybrids; d. Brassocattleyas 5; e. Vanada 18; f. Mokara 6; g. Brassavola Nodosa 6; h. Oncidiums 26; i. Tolumnia 45; j. Rhyncostylis 6; k. Bulbophyllums 5; l. others 16.

Q: How have you sourced/collected your orchids?

A: Mostly during orchid Society meetings/Orchid Shows, Orchid Nurseries, by way of exchange from the members of TOSKAR.

Q: How do you like the activities of TOSKAR and have you been benefitted by the activities?

A: Of course, I like the activities. I participate in all its activities BMM, Orchid Shows, etc. I have been immensely benefitted by the programs, lectures, Power Point presentations, demonstration of Orchid growing techniques, procurement of plants & activities for the members and various competitions of Shows. Interactions with its members with experience has been a help – especially some of my close friends like Dr. Shashidhar, Nageshwar etc.

Q: What is the size of your rooftop green house and what are the provisions inside?

A: About 400 sq. ft. area. I have used fabricated GI structure over which UV stabilized poly film is tightly covered for diffused uniform light. Below it, a layer of green shade net has been provided to adjust the light & temperature requirement of orchids. Sides have been left open for proper air movement, no fans to control temperature. I have provided foggers with timers to maintain adequate humidity and reducing temperature. I also use hose pipe as and when required. Water-proofing has been done to the floor of rooftop. Normally I use water supplied by BWSSB/Corporation.

Q: What technique you follow for growing orchids?

A: I prefer hanging epiphytic orchids like Cattleya, Dendrobium, Oncidium, Phalaenopsis, Renanthera, Vanda, etc. either on wooden blocks or containers/pots. Terrestrial orchids are grown in pots and kept on benches or floor.

Q: What potting medium you use?

A: Coco chips, charcoal, New Zealand bark, fern tree fiber/bark, Old wooden sleepers.

Q: How frequently you fertilize your orchids and which fertilizer?

A: I fertilize almost twice a month along with fungicide. NPK fertilizer 19:19:19. The one I brought from USA viz. Dyna grow has given me better results and I use this fertilizer only these days.

Q: How frequently you water your Orchids?

A: I water every day and do misting also.

Q: How much time you spend with your orchids?

A: Almost one to two hours daily.

Q: What is your investment initially on this Rooftop Orchid Garden?

A: I spent about Rs. 50,000/- for the construction of Green-house and installation of foggers & timers, etc. Orchid plants are expensive and I have gradually added them year after year.

Q: How do you like this hobby?

A: Though an expensive hobby, I don't mind spending, as it gives me immense happiness & pleasure. I love orchids and like this hobby.

Q: Have received any awards, prizes, ribbons by TOSKAR?

A: Yes of course. About 5 awards in Orchid Shows and Display Competitions.

Q: Do you have visitors to your Orchid Garden?

A: Yes. Those interested in Orchids do visit us regularly and we are happy to welcome anybody who is interested in this hobby.

Q: What is your message to the Members of TOSKAR?

A: Growing orchids is a great hobby. Orchids require love & care as we do for our pets. Regular attention and spending time with them gives better results with great satisfaction and peace of mind. Grow them, love them, care them.

Thank you. Wish you happy orchid growing!  
- Shashidhar K. S. & Sadananda Hegde.



Orchid couple



Den. Hybrid



Ascocentrum hybrid





Blc Waine Leopard



Den. Hybrid



Neofinetia hybrid peaches



Brassavola hybrid



Den Rungakumul



Lava burst





Balu's orchid garden

## **TOSI ORGANISES NATIONAL CONFERENCE ON ORCHIDS IN DEHRADUN**

The National Conference cum Workshop on “Recent Trends in Biology, Culture, Conservation, Commercialization, and Sustainable Utilization of Medicinally and Floriculturally Important Orchids” was organized by The Orchid Society of India (TOSI) jointly with and at Graphic Era University (GEU), Dehradun (Uttarakhand), during March 24-26, 2017. Over 100 delegates from all over the country, from 30 Institutions in 15 states/UTs of the country participated in this conference. Besides, an Orchid show based on cut flowers, photographs, paintings, books and Journals; and on the spot painting competition for the school and young students under different categories were organized during the conference, with a view to generating awareness about the orchids at grass root level. The painting competition attracted nearly 100 participants, despite the annual examination schedule, during the said period. An International Journal, The Journal of The Orchid Society of India (*J. Orchid Soc. India* Volume 30, 2016), and newsletter (*Orchid News* Volume 32, 2016) were released during the Conference along with Souvenir cum Abstract book – as reported by Prof. Promila Pathak, Secretary, TOSI.

Dr. Sadananda Hegde, President, TOSKAR participated in the conference as an invited speaker and presented a talk on, “**GROWING ORCHIDS IN BENGALURU FOR ROUND THE YEAR BLOOMS**”. The paper was co-authored by M. Nageshwar & K. S. Shashidhar. The Abstract of the talk/PPT presentation is as given below:

**Topic: GROWING ORCHIDS IN BENGALURU FOR ROUND THE YEAR BLOOMS**

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**ABSTRACT:** With the activities of The Orchid Society of Karnataka (TOSKAR) in Bengaluru over the last 12 years, there has been a craze for growing varieties of orchids – hybrids & species from across the world. The Society which started in 2005 with hardly nine (9) members, has today over 500 Life members and equally the same number of ordinary members who grow orchids as a hobby in their homes, on terraces, verandas and in home-gardens. Some have also ventured growing orchids as a commercial enterprise in Bengaluru, Karnataka. The Society has been conducting Bimonthly meetings and training programs round the year to the members & non-members for growing various types of orchids – species & hybrids procured from reliable sources and conducts orchid display/show grown by the members every alternate month during such meetings. In this paper, based on the experience over the last one decade, an attempt has been made to present a flowering calendar of orchids that can be grown in Bengaluru urban area on the roof top, balconies, gardens, net houses and verandah as per the available space, for round the year blooms. As many as 83 species three varieties and 102 hybrid clones belonging to 28 hybrid genera have been included in the Calendar of Flowering(Month-wise) with notes on their nativity & flowering behaviour. Some tips for growing these orchids as per their habit and habitat and environmental conditions have also been given for successful growth and round the year blooms.

## RESEARCH NOTES

- A Research work carried out on “*in vitro* culture of roots and leaves of a rare ornamental orchid *Hygrochilus parishii* (Veitch & Reichb. f.) Pfitz.”, by a team of scientists viz. Dr. R. Shadang from Forest Research Institute, Itanagar (presently working in Nagaland), Prof. Padmanabh Dwivedi from Banaras Hindu University, Varanasi and Dr. S. N. Hegde (former Director, FRI, Itanagar, presently in Bangalore) has shown highest response in the formation of callus, differentiation of Plbs (protocorm like bodies) and subsequent differentiation into plantlets in Vacin & Went media supplemented with  $0.5\text{mg l}^{-1}$  NAA and 15%CM(coconut water) and MS medium with 15% CM and  $0.5\text{mg l}^{-1}$  BAP, respectively. This work would help conserve and propagate rare & endangered orchids adopting this micropropagation technique. Reference vide *The International Journal Plant Reproductive Biology* 9(1), January 2017, pp. 30 - 33.
- A. In a research communication by K. S. Rab, Scientist, from Orchid Research Centre, Tipi, Bhalukpong, Arunachal Pradesh, occurrence of an endangered slipper orchid, ***Paphiopedilum venustum* (Wall ex Sim) Pfitz.**, has been reported in Papumpare District of Arunachal Pradesh which happens to be the extension of distribution of this species eastwards in Arunachal Pradesh (vide. *Bulletin of Arunachal Forest Research Vol. 30 & 31, Nos. 1 & 2* (2015 – 16), pp. 95 – 96). Earlier this species was reported by Dr. S. N. Hegde in Doimara Forest Reserve area near Tipi (vide: *Arunachal Forest News, vol. 9(2)*: 11 – 16).  
  
B. Similarly, in the same Volume of *Bulletin of the Arunachal Forest Research*, pp. 97-98, another rare terrestrial orchid, *Phaius wallichii* Lindl., has been reported to occur in Doimara Forest near Tipi, Arunachal Pradesh, for the first time by Junter Nyorak, from ORC, Tipi and this happens to be a new distributional record for the NE region. The study enumerates the species with illustration and distinguishes this species from its close ally, *P. tankervilleae* having drooping flowers.

**SOME NOTES ON THE IDENTITY OF *CYMBIDIUM ALOIFOLIUM* (L.) Sw.  
AND *C. BICOLOR* LINDL.**

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**INTRODUCTION**

The genus *Cymbidium* Sw. is characterized by cymbiform (boat-shaped) column and 2 or 4 pollinia. The species of the genus may be terrestrial or epiphytic in habit. About 51 species under 15 sections have been reported occur (Seidenfaden 1983) and are widely distributed from the Himalayas to China, Thailand, Malaysia and up to Australia. In India, 24 species have been reported (Chowdhury 1998, Hegde 1984 & 1999, Pradhan 1979) under various sections of this genus. In Karnataka, three species viz. *C. aloifolium* (L) Sw., *C. bicolor* Lindl. and *C. ensifolium* var. *haematodes* (Lindl.) Du Pay & Cribb have been reported (Rao & Sridhar 2007) out of which former two species belong to the section *Cymbidium* proper. This section is characterized by the presence of 2 pollinia only. Interestingly, *C. aloifolium* is the type species of the genus *Cymbidium* Sw. Both *C. aloifolium* and *C. bicolor* have considerable morphological similarities often leading to nomenclatural confusions. In the following paragraphs, an attempt has been made to clarify and illustrate diagnostic features with relevant notes on their correct identity.

**DESCRIPTION OF SPECIES**

***C. aloifolium* (L) Sw.:** It is an epiphytic herb with huge clumps growing on tree trunks in tropical areas. Pseudobulbs are bilaterally flattened, ovate forming a thick cluster/clump with prominent ageotropic roots in between. Leaves are thick, erect, linear-oblong, 3 – 5, about 50 cm. long and 3 – 4 cm. wide, unequally bilobed at apex. Inflorescence arising from the base of the pseudobulb, basally sheathed, pendulous, about 35 – 45 cm. long with many flowers. **Flowers, 3.5 – 4 cm. across, Sepals & petals, subequal, yellowish with purple stripe (see photos). Lip 3 – lobed; side lobes of lip longer than column; mid-lobe decurved, with pink or purple longitudinal stripes; disk with two interrupted keels. These characters are diagnostics of this species.** Flowering in April – May. Common in the wild.

It is distributed throughout Northern & Southern India, Malaysia and Indo-China.

***C. bicolor* Lindl.:** Morphologically resembles *C. aloifolium*, but differing in short or not clearly differentiated pseudobulbs; comparatively shorter inflorescence, **smaller flowers – about 3 cm. across.** Margin of petals & sepals yellowish with brownish-purple coloration along the midrib. Lip is 3 – lobed; **side-lobes shorter than column; keels not broken at middle; mid-lobe dotted with purple. These characters are diagnostics of this species.** Flowering March – April.

It is distributed in NE India, Karnataka, Kerala, Tamilnadu, Srilanka, Thailand & Java.

Both the species can be cultivated in hanging baskets or pots in a compost mixture of brick pieces: charcoal: leaf mold, in equal proportion or directly tied up, on the tree trunk. It likes bright light under semi-shaded condition. Watering thrice a week with about 60 % humidity ensures good growth & flowering.



*Cymbidium aloifolium* (left) and *C. bicolor* (right) plants grown in pots. Note the similarities in leaves & pseudobulbs (photo above) and differences in flower colour & size (Photos below).



Left: *C. aloifolium*; Right: *C. bicolor*.

*C. aloifolium*

*C. bicolor*

Note the lip and column structures in the middle of flowers in the photos above. Also note lateral lobes of mid-lobe, apical lobe size, structure & colour in both the species which are distinctly different.

## DISCUSSION

There has been a nomenclatural confusion in the correct identity of these two species viz. *C. aloifolium* and *C. bicolor*. Seidenfaden (1983) has exhaustively dealt on the identity of these species referring to the Thai species and citing various herbarium records from India, Sri Lanka, Burma and other southeast Asian countries. Santapau & Kapadia (1966) has also discussed on the identity of *C. aloifolium*, *C. bicolor* & *C. pendulum* and finds it difficult to differentiate them from the herbarium records. However, in the present work, diagnostic features of *aloifolium* & *bicolor* have been illustrated from the study of live plants under cultivation in bloom. While the morphological features of plants of these two species are similar, the flower characters – size & color of sepals & petals, lip structure, length & shape of side & mid-lobes, and that of keels running in the mid of the lip show identifiable differences. Accordingly, key for distinguishing these two species have been presented below:

- Flowers, 3.5 – 4 cm. across; side lobes of lip longer than column; mid-lobe decurved, with pink or purple longitudinal stripes; disk with two interrupted keels..... *C. aloifolium*
- Flowers smaller, +/- 3 cm. across; side-lobes shorter than column; keels not interrupted at middle; mid-lobe dotted with purple..... *C. bicolor*.

It is clear from the above study that the two species viz. *C. aloifolium* & *C. bicolor* are two distinct species.

## REFERENCES

- Ananda Rao, T. & Sridhar, S. 2007. **Wild Orchids in Karnataka** – A Pictorial Compendium. INCERT, Sheshadripuram, Bangalore.
- Chowdhury H. G. 1998. **Orchid Flora of Arunachal Pradesh**. Bishen Singh Mahendrapal Singh, Dehra Dun. 251 – 55.
- Hegde, S. N. 1984. **Orchids of Arunachal**. Department of Environment & Forests, Arunachal Pradesh, Itanagar.
- Hegde, S. N. 1999. **Cymbidiums – Cultivation Technique & Trade**. SFRI Information Bulletin No.8. 1 – 21.
- Pradhan, U. C. 1979. **Indian Orchids: Guide to Identification & Culture**. Vol. II. Kalimpong.
- Santapau, H. & Kapadia, Z. 1966. **The Orchids of Bombay**. GOI. Calcutta.
- Seidenfaden G. 1983. Orchid Genera in Thailand XI. Cymbidieae Pfitz. **Opera Botanica.No. 72**. Pp.65 – 92.

## Proceedings of the Bi Monthly Meeting held on 22 April, 2017

1. Ramakrishna Nidagal from Sydney, Australia gave a talk on how he grows his orchids with fantastic pictures of his grow area (2 glass houses and a heated house) and specifics of Orchid culture in Southern hemisphere
2. A discussion was open to decide on the scale of the Orchid show to be planned. A general consensus was to conduct the orchid show to spread awareness. President Dr. Hegde insisted that it requires a lot of human capital (Volunteering) and financial mobilization. Members should come forward to make the show a success. Appeal members to come forward with ideas and suggestions to make orchid show a success. reach out any of the EC members for the same.
3. There was a good reception to Orchid display and competition.

### Species Winners

1. *Grammatophyllum scriptum* (grown by Nageshwar)
2. *Dendrobium amabile* (grown by Sundari)
3. *Dendrobium chrysotoxum* (grown by Suresh Kalyanpur)

### Hybrid Winners

1. *Dendrobium Rungkmol* (grown by Balanarasimha)
  2. *Grammatophyllum Jumbo Grand* (grown by Nageshwar)
  3. *Dendrobium NOID hybrid* (grown by Everest)
- Congratulations to the winners. Species and hybrid winners are requested to share a small write up on their winning plant and its culture. A short write up template would be shared.
  - 3 new members joined orchid society and a warm welcome to them.
  - Share your feedback on the meeting and also share your most wanted accessories/supplies required so that we could target to buy 3-4 most wanted items.
  - Any of the members interested in joining the Paphiopedilum Special interest group, can contact any of the EC members.
  - Any of the members interested in writing articles for the Newsletter or TOSKAR website can contact me

**Photo Feature**  
**Select Photographs from Collection of Members of the Society**



**Dendrobium Pink Prism**



**Sc Crystalle Smith**



*Paphiopedilum callosum*



**Den Oriental Smile ButterFly**



*Vanda denisoniana* hybrid



*Aerides odorata* yellow lip



*Dendrobium devonianum*



*Aerides crista*

