



Orchids.....Potential in temperate areas

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India is recognized as a significant producer of orchids in the world. Near about 1,300 species of orchids are found in India which constitutes almost 10 per cent of the world orchid flora with Himalayas as their main home (Medhi and Chakrabarti, 2009). Orchids are the most fascinating and beautiful flowering plants belonging to family orchidaceae. Orchidaceae is a cosmopolitan family distributed throughout the world. Orchids is most highly evolved family among monocotyledons with near about 1000 genera and 25,000-35,000 species which exhibit an incredible range of diversity in size, shape and of the colour of their flowers. About 200 orchid species are found in North-Western Himalayas, 800 in North-Eastern India while as 300 orchids occur in Western Ghats. North-Eastern India owing to its peculiar gradient and varied climatic conditions contains largest group of temperate, sub-tropical orchids (Rao, 2004). India has a very large variety of orchids and hilly regions have one or the other orchid species flowering almost throughout the year. The diversity is so large that there are large-flowered, terrestrial, epiphytic and also saprophytic orchids. The largest terrestrial genus is *Habenaria* (100 spp.) and the largest epiphytic genus is *Dendrobium* (70 spp.).

Orchids are widely distributed across the globe. However, concentrated mainly in three areas viz., Tropical America, Indo-Malayan and the Eastern Himalaya. The majority (72%) of the species are epiphytic most abundant in the tropical forests. Based on their varying habitats, orchids are classified into saprophytic (growing on dead and decaying matter), terrestrial (growing on ground), epiphytic (growing on trees or shrubs) and lithophytic (growing on rocks). These plants exhibit an amazing diversity in morphology and range in size from a few millimeters e.g. some species of *Bulbophyllum* to more than 30 m e.g. *Vanilla*. The maximum diversity of orchids is observed in Eastern India and the Western Ghats. The epiphytic orchids are abundant upto 1800 masl and their frequency of occurrence decreases with the increase in altitude. Majority of the terrestrial species grow in the Western Himalaya and the higher altitude in the Eastern Himalaya. John Firminger Duthie (1845-1922) was the first botanist who compiled the orchids of the North-West

Himalaya based on his own collections and coupled with previous collections made by the earlier explorers especially Strachey and Winterbottom. After independence, there was a spurt in the exploration in the Himalayan region and many workers collected orchids and other flowering plants from this region. Deva and Naithani (1986) revised Duthie's orchids of north-western Himalaya based on recent collections by various botanists and provided an illustrated account of 239 orchid species from the region. Jalal (2012) have also given the detailed account of orchids from Kumaun Himalaya and described 192 species. At the same time, this group poses a big challenge for conservationists because they are extremely sensitive to habitat alteration as they have co-evolved with the specialized pollinators and fungal partners. A large number of orchids also exhibit a close association with the lower groups of plants especially mosses. Abundance of orchids in any given area indicates the better health of an ecosystem. Orchids thus, can be regarded as keystone species in forest ecosystems. Orchids, more than any other plants, exert a mysterious fascination for most people and all the wild orchids of tropical regions are highly puzzling and peculiar. They culminate one of the evolutionary lines of monocots and are still in an active state of speciation.

History : Orchids are highly evolved group of plants occupying a top position in the plant Kingdom as the human beings does in animal kingdom. Man's association with orchids seems to have its origin way back in the history of human civilization. There is evidence to show that in the orient, orchids were cultivated as early as 500 BC. History of orchids probably started with their use as medicinal plants. Theophrastus (370-285 BC) gave the name "Orchids" (Greek word Orchis meaning testicles) to the group of bizarre plants on the basis of the resemblance of paired underground tubers of these plants to masculine anatomy. This leads to the misconception that the orchids possess aphrodisiac properties (Singh *et al.*, 2012) and eating of underground tubers might "provoke venus". Orchids have a very wide range of distribution. They are found to occur in all parts of the world except, perhaps, in the Antarctica. Though the family is cosmopolitan, many more species are found in the tropics than in the temperate

regions (Khasin and Mohana, 1999). In the Indian Vedic scriptures there is a mention of the plants under the name "VANDA", which has been adapted as a generic name in one of the most beautiful group of orchids.

Distribution and habitat: Majority of the cultivated orchids are native of tropical countries and occur in their greatest diversity in humid tropical forests of South and Central America, Mexico, India, Sri Lanka (Ceylon), Myanmar (Burma), China, Thailand, Malaysia, Philippines, New Guinea and Australia (Arditti, 1992). Brazilian Cattleyas, Mexican Laelias and Indian Dendrobiums, Cymbidiums and Vandas have played a major role in the development of modern orchid industry in the world. In India, Kerala, Karnataka, Tamil Nadu, Maharashtra, Sikkim, West Bengal, Andaman's, Hilly regions of Uttar Pradesh, Himachal Pradesh and entire Northeastern region are suitable for commercial cultivation of orchids (Singh *et al.*, 2012). Orchids are quite unlike other plants. As a family they stand apart, divided by their mode of growth, the formation of their flowers and their seed production. Everything about the orchids is different and perhaps this is what makes them so fascinating. Orchids are perennial herbs, some are either epiphytic, terrestrial or lithophytes; a few are saprophytic or semi-aquatic (Chase *et al.*, 2001).

In India the area under commercial cultivation of orchid's particularly tropical orchids like Dendrobium etc. is limited to the Southern states and Maharashtra, whereas temperate orchids like Cymbidium are grown in North-Eastern states. Most of the produce is sold internally with meager export. Greenhouse technology is utilized for growing Dendrobium orchids, as it requires reduced light intensity, low temperature and high humidity. Growing of orchids commercially in India was not organized and is in the hands of Hobbyist and few dealers who mainly depended on wild collections from forest to meet a large part of their foreign and local demands. Due to this some of the orchid growing areas are now without any orchid. This necessitates the commercial cultivation of both native and exotic species to meet the demand and also to conserve the country's orchid wealth. Prospects of an increasing consumer demand and buoyant world market have promoted the status of orchid growing to an industry in our country in the past two decades. Orchid trade is still in infancy due to the lack of knowledge on the varieties suitable for commercial production and export. Moreover, research work on the evaluation of commercial hybrids and varieties for suitability to our condition is very limited in our country.

Ornamental Indian species : Some of the Indian orchid

species which are of high ornamental value are : *Aerides crispum*, *A. fieldingii*, *A. multiflorum*, *A. odoratum*, *Anaectochilus roxburghii*, *Arachnis clarkei*, *Arundina graminifolio*, *Bulbophyllum leopardinum*, *Calanthe masuca*, *Coelogyne elatia*, *C. devonianum*, *Cymbidium pendulum*, *C. longifolium*, *C. munronianum*, *Dendrobium aggregatum*, *D. aphyllum*, *D. fimbriatum*, *D. jenkinsii*, *D. moschatum*, *D. nobile*, *Paphiopedilum faireanum*, *P. venustum*, *P. hirsutissimum*, *P. insigne*, *Phaius wallichii*, *Pleione praecox*, *Rhynchostylis retusa*, *Thunia alba*, *Vanda cristata*, *V. coerulea* and *V. coerulescens*.

Orchid conservation: Of the world's 30,000 orchid species, some 10% (3,000) are believed to be endangered in their native habitats. There are two major causes; the primary threat is from the physical destruction of habitat. Clearance of natural vegetation for timber, crop cultivation or forestry, or for industrial or urban development has decimated uncounted species from Indonesia to Brazil. Habitat destruction not only destroys the places for the plants to live, but also causes loss of the orchid's pollinators, other plants, and fungi that they depend on. The other threat is also man-caused such as over-collection. Despite bans in many countries on the collection and export of native plants, in many cases the damage to the population is already beyond repair and there is still a trade from unscrupulous orchid growers. A large number of orchid species, which were present in plenty in Indian forests, are now at the verge of extinction and some of them have become so rare that a large number of botanical teams were unable to trace them. To cite an example *Paphiopedilum druryi*, which was once found in plenty in Agastaya Hills in south India, is now difficult to locate (Chase *et al.*, 2005).

The list of plants banned or restricted for export from India formerly included a few orchids but now include all orchids growing wild. The convention of International Trade in Endangered Species of Fauna and Flora (CITES), ratified by India, places all species of Orchidaceae under Appendix II, meaning thereby that their trade will be only through export permits. Steps have also been taken to conserve Indian native species by establishing Orchidaria, sanctuaries and germplasm conservation centres. Botanical survey of India has established two Orchidaria one at Shillong and other at Yercaud to conserve rare and endangered species. The ICAR research complex at Shillong, the Indian Institute of Horticultural Research at Hessaraghatta and the Indian Botanic Gardens at Calcutta maintain collections of orchids in their Orchidaria. Some

states have also established orchid sanctuaries in Sikkim at Singtom and Deorali and in Arunachal Pradesh at Tapi. However, the concept of *in situ* conservation in the wild condition of the existing rich orchid flora at their nativity is rather lacking. Hence there should be selection of areas rich in orchids as ‘orchid preserves’ at sectoral levels in the hot spot areas to prevent deforestation, habitat destruction, and indiscriminate collection by orchid lovers and exploitation by tradesman. The International Union for Conservation of Nature (IUCN) has played a major role in focusing global concern on the loss or extinction of species and is now the accepted authority on such matters. The first Red Data Book was launched by IUCN in 1966. Now, it is revised annually and called the IUCN Red List, which is available in its electronic version since 2000. Threats to orchid species in the Indian region were first documented by Arditti (1992). Arditti (1992) contributed the first red data sheet on Indian orchids to the IUCN Plant Red Data Book, which served as a model for the production of Red Data Book of Indian Plants. Dressler and Robert (1993) listed 58 species threatened in India. It also included 13 orchid species of western Himalaya. In 1984, under the banner of IUCN, the Orchid Specialist Group (OSG) was established for orchid conservation. It has many regional groups; ISROSG-Indian Subcontinent Regional Orchid Specialist Group covers the Indian sub continental region. In the international scenario, several treaties have been formulated for the protection of biodiversity as a whole, which encompasses the protection of wild orchids also. Orchids are one such group of plants which grow in a variety of habitats throughout the globe, but they are very sensitive to habitat change. A number of species are rare and threatened throughout the world, including western Himalayas, owing to habitat degradation and fragmentation as a result of various anthropogenic influences such as land development activities, building of dams, constructions of roads, commercial exploitation of the species, overgrazing and frequent forest fires. Some orchid species require unique habitat and microhabitats so they are confined to particular elevations and forest types. Some are naturally rare; others are so because of geographic distribution, narrow habitat requirements, and low-density populations. Several species that have been reported earlier from the region have not been recollected, thus indicating their possible disappearance due to habitat changes. As most of the orchids are insect pollinated, the depletion in the population of insect pollinators may also lead to the depletion in the population of particular orchid species.

Suggestive measures for conservation: As mentioned above, maximum orchids are threatened. For their long term survival in nature, they need to be protected through *in situ* and *ex situ* conservation. *In situ* orchid conservation and habitat preservation is the first line of defense for safeguarding orchid species for the future. The following measures are suggested for the long term conservation of orchids in western Himalaya:

- 145 species, which are very rare and sparse need immediate action for conservation.
- Banj-oak forests and riverine forests should be protected region wise. Initiate ecological restoration of degraded riverine forests and promote afforestation of suitable host tree species such as *Toona ciliata*, *Engelhardria spicata* and *Quercus leucotrichophora*.
- Endemic and near endemic species need special attention e.g., *Peristylus kumaonensis*.
- Urgent need to conduct a population monitoring program together with orchid ecology so that we can use this information to design orchid conservation plans for the intact regions of habitat where orchids still thrive.
- Establishment of orchid seed bank and germplasm banks.
- Local people should be made aware of this wealth by means of awareness programs. Orchid conservation areas can be developed for tourists and college students so that they can visit these areas during their educational trips.

Potential of orchids in Kashmir Valley: The region falls under high rain and snowfall zone and climate ranges from temperate to alpine. The region is characterized by difficult terrains, wide variation in slopes and altitude and cultivation practices. The transport and communication system is poorly developed. As a result, majority of area in the region still remains inaccessible. Majority of the population is dependent on agriculture, horticulture and allied land based activities. The region once richly endowed with luxuriant forest growth and rich crop genetic diversity is denuded due to human interference and adoption of unscientific land use systems.

Western Himalayas is richly endowed with orchid genetic resources. The region is home to about 225 species of orchids, out of total 1300 species in India. The region is not only rich in terms of number of species but more importantly many of them rank at the top of the list of ornamenteally important ones. However, this natural orchid wealth of the country as a whole and of this region in particular, is yet to be judiciously utilized and managed to harvest economic benefit. Moreover, there is always the

danger of losing most of the valuable orchid wealth, unless scientific conservation measures are taken along with proper utilization. This is evident from the very painful fact that many of these beautiful, once abundant species, are now rare and some of them are already no more visible in the wild.

Strengths: Strength of the region lies in the following

- Rich gene pool.
- Natural habitat of many ornamental species.
- Superiority of many of the species in terms of desirable horticultural traits.
- Suitable ago climatic conditions.
- Scope for expansion of area in tribal tracts.
- Fast growing domestic market and export demand.
- Recent liberal Government policies in the floriculture sector.
- Low labour cost in comparison to the European countries.
- Specific geographic location to the major flower consumption centers.
- Availability of trained scientific manpower and good institutional infrastructure.

Shortcomings: Despite its immense genetic richness and other certain advantages, the orchid trade in particular and floricultural trade in general, from the Western region could not develop upto the desired level due to the following shortcomings.

- Lack of interest and unawareness.
- Lack of scientific characterization, evaluation and utilization of available resources
- Non-availability of quality planting materials of internationally accepted Varieties/hybrids.
- Non-availability of quality planting material on mass scale.
- High initial investment and maintenance cost.
- Very long gestation period in case of orchids.
- Lack of Scientific information on agro-techniques.
- Lack of information on integrated pest management.
- Inadequate information on post harvest management practices.
- Weak marketing linkages.
- Lack of information on economics of orchids.
- Lack of suitable storage, packaging and transport facility.
- Inadequate research and extension support.

Strategies: To harvest the full potential of the orchid culture as a highly profitable enterprise in India as a whole

and in Kashmir valley in particular proper research support is very essential. For resolving major constraints in production of orchids, mission mode approach is essential in the following areas.

- Collection, characterization, evaluation, conservation and improvement.
- Systematic breeding and production of commercial varieties and hybrids of superior quality.
- Standardization of agro-techniques for commercial cultivation and package of practices for post-harvest management for domestic and export markets.
- Production of quality planting material.
- A repository of information and a centre for training

Commercially potential orchids of Kashmir

Himalaya : The region is endowed with nature's bounty and cool growing orchids can be grown in this region at different altitudes. This region has a significant advantage for cool growing orchids.

Orchids for cut flower : In the temperate Kashmir, the cool growing type, *Cymbidiums* have the greatest Potential. *Cymbidiums* are the front runner among all orchids in the global cut flower



trade. Among all Orchid species used as cut flowers, *Cymbidiums* occupies the foremost position. It fetches highest price per flower on the international market. The international flower trade is solely based on the modern hybrids bred from 5 or 6 larger flowered species found in the so called Himalayan Orchid belt at elevations between 1000 and 2000 meter. The flowers of the wild species are not suitable for international trade due to their inferiority in terms of floral form and colour, keeping quality and ability to travel long distances from farm to the auction centers. *Cymbidiums* grow vigorously and produce export worthy flowers in a relatively narrow temperature regime (10-25°C). For production of export worthy spikes, plants should be protected from all sorts of weather damage, at least at the time of flowering. *Cymbidiums* will be sold as whole cut spike or as individual blooms. Standard spike should not contain less than 8 flowers per spike. However suitable favourable conditions can be made available artificially for growing *Dendrobiums*, *Vandas*, *Arandas*, *Arachnis*, etc. These are the most popular cut flower sprays worldwide. The lower altitudes in this region are just ideal for many of these hybrids.

Potted orchids : In the present scenario beside production of cut flowers, orchids also have great Potential as potted ornamentals. Many of the Indian species, northeastern Himalayan species in particular, are suitable for their direct use as high value potted novelty. Unfortunately, this still remains a gray area and suffers from lack of attention and realization of its tremendous potential. Genus *Aerides*, *Arachnanthe*, *Bulbophyllum*, *Calanthe*, *Coelogyne*, *Cymbidium*, *Dendrobium*, *Eria*, *Phaius*, *Phalaenopsis*, *Pleione*, *Rhyncostyles*, *Vanda* were found to possess the desirable characteristics as pot plants.



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