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ECOLOGICAL ADAPTABILITY OF ORCHIDS IN INDIA

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Abstract

India has vast genetic resources of orchids which have a great potential in the field of floriculture, herbal, pharmaceutical and tourism industry of the country. But these resources are declining rapidly due to destruction, degradation and shrinkage of natural habitats and commercial collection pressures. There is urgent need to conserve these valuable biological resources in natural habitats supplemented with preservation using modern methods of conservation like in vitro conservation, seed storage and cryopreservation. A networking of institutions engaged in conservation of orchids coupled with strong orchid breeding programme would enhance judicious utilization of orchids.
Key words: Orchids, Ecology, Floriculture.

Introduction

Biological diversity is the variability among all living organisms existing on earth in various ecosystems and ecological complexes. Orchids represent royalty and aristocracy in floriculture and herbal medicine. The flowers of orchids are well known for their uniqueness of shape, breath taking colors, and exceptionally long shelf life that surpasses many other floriculture crops. These qualities have made orchid growing a highly profitable industry all-over the world. A large number of species bear attractive flowers and have capacity for interspecific as well as intergeneric hybridization that has generated tremendous possibilities for producing hybrids of diverse floral characteristics. India is one of the primary/secondary centres of orchid biodiversity and the major regions of diversity are North Eastern Himalayas, Western Ghats, and Andaman and Nicobar Islands. Indian orchids have also been used in various indigenous systems of medicines since time immemorial. Whereas, the systematic collection and conservation of orchids for value addition through
crossing and selection has started very recently in our country. Today, more than 100,000 hybrids are known globally and cultivated for cut flowers and potted plants and more and more new ones are being registered every month [1].
Orchids are highly vulnerable to loss or genetic erosion even in their natural habitat due to their specialized life cycle and human intervention. Due to continuous over-exploitation and destruction of natural habitats,

populations of several orchid species have been declining very fast. There is immediate need to take up various conservation measures on scientific lines so that these genetic wealth are conserved for the future world [2].

Orchid diversity of India

Orchids are herbaceous perennial plants with wide range of growth habit and habitat. They can grow as terrestrials, epiphytes, lithophytes etc. and as per their distribution may be broadly classified into tropical, subtropical, and temperate. Orchids have very wide range of distribution in India and have been recorded from low-level plains to an elevation of 4300 m. Orchids are the most evolved family of monocotyledonous plants and is represented by nearly 25,000-35,000 species belonging to 1000 genera. Nearly 1300 species of orchids are found in India distributed in different parts of the country. However, maximum orchid species are found in the Himalayan region especially the North Eastern Himalayas. Nearly 876 orchid species from 151 genera have been reported from this part of the country representing 70% of the orchid flora of India. Many of these endemic and rare species shows high ornamental value. *Paphiopedilum fairrieanum, Paphiopedilum insigne, Paphiopedilum villosum, Paphiopedilum spicerianum, Paphiopedilum hirsutissimum, Paphiopedilum venustum, Anoectochilus sikkimensis, Vanda coerulea, Papilionanthe teres, Renanthera imschootiana, Rhynchostylis retusa, Pleione maculata, Pleione praecox, Pleione humilis, Cymbidium eburneum, Dendrobium hookerianum, Dendrobium densiflorum, Dendrobium devonianum, Dendrobium thrysiflorum, Thunia marshalliana* etc. are some of the promising orchids of this region. Among the eight north eastern states of India, highest numbers of orchid genera have been reported from Sikkim (137 genera and 525 species) followed by Arunachal Pradesh (126 genera and 550 species) and recognized as paradise of orchids [2].

Threats to orchid biodiversity

Orchids are highly vulnerable to loss or erosion even in their natural habitat due to their specialized life cycle (mode of living, dependency on pollinators for pollination, lack of reserved food material in the seed, and reliance on mycorrhizal fungi for seed germination) and human intervention. Each species have their specialized adaptive requirements and sometimes very restricted in distribution. Any disturbance to its natural habitat beyond a tolerable limit causes threat for their survival. Appendix-I of CITES (Convention of International Trade in Endangered Species) list the globally protected species whereas nationally protected species listed under Schedule-VI of Wild Life (Protection) Act 1972. The red data book of Indian Plants published by Botanical Survey of India, list the plant species facing threats of various categories and require immediate attention. Recent estimates state that nearly 250 species of native orchids are under the threats of various categories. Certain species like Aphyllorchis gollanii, Coelogyne truetleri, Anoectochilus rotandifolius, Paphiopedilum charlsworthii, Paphiopedilum wardii, Vanda wightiana and Pleione lagenaria are no longer found in India. Out of 352 orchids endemic to the country, 40 are “endangered” and 72 are “vulnerable” [3]. Once these species are lost or become extinct, it will be an irrecoverable loss for the country as biodiversity is the sovereign right of the country as per Convention of Biodiversity. Even in the orchidariums, plants may be lost due to poor cultural conditions, indifferent housing, changing and often inexperienced staff. Due to continuous over-exploitation and
destruction of natural habitats, populations of several orchid species have been declining very fast. The Global Action Plan for Conservation of Biodiversity calls upon
ensuring 60% of the threatened plant spp. (preferably in the country of origin) is conserved under ex situ (Target 8).

Conservation of orchid biodiversity

Conservation of orchids involves protecting the natural habitat of the species, encouraging orchid biodiversity and ensuring the survival of the rare species of orchids. Orchid conservation may be carried out both in-situ and ex-situ mode.

***In-situ* conservation strategies**

Thousands of species of orchids are at risk for extinction
because their habitats are disappearing. The orchids possess specialized mode of living and require specific pollinators for effective fertilization. Orchids grow in a particular habitat because that is where they thrive. Removing and transplanting them elsewhere forces the orchids to adapt to an entirely new environment where the plant might not be as successful. In-situ conservation of species is most desirable for orchids as it ensures

their natural growth, proliferation and perpetuation which allow the process of evolution to continue as part of natural ecosystem. India has an elaborate Protective Area Network (PAN) comprising 86 National Parks, 480 wildlife sanctuaries covering about 4.66% of total geographical area of the country which is expected to further expand in the future [3]. This network provides the protection to the species that are present in those forests. Unfortunately, many important and endangered orchids lie outside the PAN (viz., *Paphiopedilum druryi in Aghasthymalai hills of Kerala, Vanda coerulea in Meghalaya, Paphiopedilum wardii and P. specerianum* in Assam, Renanthera imscootiana in Arunachal Pradesh). A few State Governments like Arunachal Pradesh, Sikkim, Karnataka, and West Bengal have designated the orchid rich habitats as "Orchid Sanctuaries" under the Wildlife Protection Act, 1972 (amended in 1992) and any attempt to remove them from their natural habitat should be considered poaching or smuggling. For the forest areas located in the vicinity of human habitats, local people may be educated about the need for such conservation measures and the activities may be undertaken in a participatory mode. However, forest fire and other such threats may even lead to extinction of rare and endemic species in those sanctuaries. Hence, in-situ conservation should also be supplemented with appropriate ex-situ conservation measures.

***Ex-situ* conservation**

Field Gene Banks

Orchidarium: Orchids are often conserved in polyhouse/
glasshouse termed as orchidarium where a large number of orchid species are kept together. These structures need to be constructed keeping in view the climatic conditions required for the species to be conserved. National Research Centre for Orchids is maintaining such orchidarium at Pakyong and Darjeeling campus (Fig. 2b). Botanical Survey of India and forest departments of various states is also maintaining such orchidariums to promote eco-tourism. Even in the orchidariums, plants may be lost due to poor cultural conditions, indifferent housing, changing and often inexperienced staff. The germplasm lines conserved in such structures are also at high risk of diseases and pests and require proper care and monitoring of the plants.

Simulated natural habitat: In India, orchid species are also conserved as live plants in various Botanical Gardens, scientific institutions and departments of forests as an ex situ conservation measure to create artificial natural habitats. This method attempts to simulate the condition of nature. This method of conserving orchid germplasm reduces the cost on maintenance and incidence of diseases and pests. Epiphytic orchids are tied on suitable host plant and terrestrials are planted in pots or in the ground. The species having wider adaptability or specific to that particular locality can be conserved by this method. This method has successfully been tried for conserving various epiphytic and terrestrial orchids at Darjeeling Campus of National Research Centre for Orchids (Fig. 2a) [4]. Three field gene banks of orchids have been established by the Botanical Survey of India at Shillong, Yurcaud and Howrah for conservation and multiplication of orchids. Similarly, states like Arunachal Pradesh, Assam, Mizoram, Karnataka, Nagaland, West Bengal, Sikkim, Himachal Pradesh and Orissa have also
collected and conserved the wild orchids. National Research Centre for Orchids, Sikkim; Tropical Botanical Garden Research Institute (TBGRI), Kerala and several
other organizations including the state forest departments are also engaged in conserving orchids. Field gene banks address the problems of maintaining plants in the orchidarium. However, it is a tedious process and demands lot of space, regular monitoring and skilled manpower [3].

Orchid seed gene bank

Millions of seeds are produced in a single capsule of
orchid. However, they lack the metabolic machinery and
functional endosperm and require specific mycorrhizal association for germination under natural conditions. Consequently, the percentage of germination is low (approximately 0.01 to 0.2%). Many of the orchids have been germinated through asymbiotic technique where germination has been found as high as 90%. The seeds of orchids are orthodox in nature and provide a great scope for long-term storage through low temperature storage. Long-term storage of orchid seeds would require studies on storage duration, seed viability, etc. Owing to their minute size, a large number of seeds can be maintained in the small space of a gene bank. However, this technique is suitable for only maintaining the species biodiversity. Genetic structure of different accession of a species can't be maintained owing to the heterozygous and heterogeneous genetic structure of orchids coupled with very high degree of cross fertilization [5].

In-vitro conservation: Maintaining orchid germplasm in field gene bank requires huge investment and the germplasm is also exposed to insect pests and diseases. Therefore, in-vitro conservation of orchid germplasm in slow growth cultures requires urgent attention. In-vitro conservation technique can also be used for revitalization of orchid germplasm affected by virus and virus-like diseases through apical meristem culture. As a matter of fact, orchids were the first plants to be tissue cultured [6]. However in-vitro conservation of orchids is yet not taken up in a very large scale in our country. There is need for studies on genetic stability to avoid the somaclonal variants and slow growth cultures for longer storage duration to avoid frequent transfers [7, 8].

Development of tissue culture protocols for rare and endangered orchids may also help in supplementing in-situ conservation measures. After identifying the natural habitats of these target species, seeds may be collected from those places. After mass multiplication of the plants via tissue/seed culture, the plants may again be reinstated in the specific habitat to establish the population and to allow multiplication under natural condition. NRC for Orchids and State Forest Departments may collaborate to carry out this kind of activities.

Cryopreservation

Cryopreservation at ultra-low temperature (-192^{o}C) is sound alternative for long term storage of plant genetic resources. Under these conditions biochemical and physiological processes are completely arrested and the plant material can be stored for unlimited period. The chances of genetic instability and the risk of contamination during sub-culturing are minimized. Tissues/explants of orchids may also be cryopreserved in liquid nitrogen cylinders as a long term storage procedure after proper treatment of cryoprotectants (like Dimethyl Sulfoxide or DMSO) and Plant Vitrification Solutions (PVS, e.g. glycerol). Two key advances in methodology have made this possible; the development of vitrification using PVS2 solution [9] and the encapsulation– dehydration technique [10]. There are some reports on cryopreservation of orchids using shoot primordia of Vanda pumila [11], Arachinis species [12], zygotic embryos of Bletilla straiata [13], seeds of Dortis pulcherrima [14], protocorm-like bodies of Cymbidium [15], Cleistostoma areitinum [16], Dendrobium Sonia 28[17]. However, standardization of protocols in large number of orchid species for cryopreservation and regeneration may pose great difficulty in this direction. The live specimens conserved ex situ in orchidarium or field gene banks are always at the risk of genetic erosion due to poor adaptation under local conditions and/ or pests and diseases and improper management. In the event of loss of conserved specimen in these orchidaria, often replenishment is resorted to from the population in natural habitats. Hence, the present conservation measures need to be systematically duplicated using multiple conservation strategies. The seed, in vitro conservation in slow growth cultures and cryopreservation techniques have found increasing use in conservation of threatened plants and needs to be applied for conservation of threatened and rare species of orchids in combination with traditional methods.

National and international regulations related to orchid biodiversity

Prior to commencement of Convention on Biological Diversity (CBD), biological diversity was considered as common heritage of mankind. Anyone was free to use biological diversity of other countries in good faith. However, after the Convention on Biological Diversity (CBD) was adopted by the United Nations, in June1992, the contracting countries were required to integrate consideration of conservation and sustainable use of biological diversity into relevant legal procedures, programmes and policies. The CBD was convened with three basic themes; namely conservation of biological diversity, their sustainable utilization and better access coupled with benefit sharing. Convention reaffirmed that states have sovereign rights over their biological resources and that the states are responsible for conserving these resources and using the same in a sustainable manner. The contracting parties to the CBD are, therefore, required to integrate considerations of conservation and sustainable use of biological diversity. India is a member of CBD and has framed its own National Biodiversity Act (2002) with almost similar theme [18]. Protection of Plant Varieties and Farmers Right Act (PPVFR Act 2001) has also been enacted for the protection to newly developed and extant varieties of crops as a follow up act for TRIPS agreement (1995). After India became signatory to the Trade Related Aspects of Intellectual Property Rights Agreement (TRIPs) in 1994, a legislation was required to be formulated. Article 27.3 (b) of this agreement requires the member countries to provide for protection of plant varieties either by a patent or by an effective sui generis system or by any combination thereof. Govt. of India enacted The Protection of Plant Varieties and Farmers' Rights Act (PPVFR) in 2001. The sui generis system for protection of plant varieties was developed integrating the rights of breeders, farmers and village communities, and taking care of the concerns for equitable sharing of benefits. The National Biodiversity Act, 2002 deals mostly with conservation and sustainable utilization of species diversity, whereas PPVFR Act takes into consideration mainly the commercial cultivars, farmer's varieties, extant varieties etc of few selected crop species which mostly utilizes the genetic diversity of a particular crop species. However crop improvement programmes also utilize wild

species to a great extent in the prebreeding activities. Hence, there is a great inter dependence between biodiversity conservation and crop improvement [19]. Till date, the PPVFR authority has notified different crop species for registration in India, including floriculture crops like Rose, Damask Rose, Chrysanthemum and three genera of orchids (e.g., Cymbidium, Dendrobium and Vanda) which have been notified very recently. Some other areas of PPVFR act where NRCO can make significant contribution are:

1. Establishment of Distinct, Uniform and Stable (DUS) criteria for various other orchid species and their hybrids which is presently constrained by lack of sufficient number of varieties of different orchid species.
2. Developing complete passport data of the parental lines and making necessary arrangement for ensuring that genetic material or parental material acquired for breeding, evolving or developing the variety has been lawfully acquired. This activity would enhance the flow of genetic material from other countries and enhance the orchid breeding capabilities of the country.
3. Help the authorities in protection of farmers Rights. Many species of orchids are under cultivation by the forest dwelling communities for their showy flowers or medicinal uses. Knowingly or unknowingly they are involved in the conservation of genetic resources of wild relatives of orchids and their improvement through selection and preservation which needs to be identified, recognized and efforts needs to be taken for identifying farmer's variety for registration under PPVFR Act after consultation with the National Biodiversity Authority and State Forest Departments.

Utilization of Orchid biodiversity

Large numbers of orchid germplasm accessions have been conserved in various field gene banks of the country. However, the germplasm conserved in different conservatories of the countries is underutilized and their use in evolution of new cultivars is rather very slow. A few cultivars have been developed but these don't meet the cut flower or potted plant quality criteria prevalent in international markets. No systematic breeding programme has so far has been taken up in the country. Further, there is lack of information about the traits of economic importance and their inheritance pattern. The access to the germplasm is also often restricted due to insufficient seed/planting material. The orchids take long time in development new varieties because of large juvenile phase in most of the orchids and perennial growth habit. The utilization of orchid germplasm could be enhanced by encouraging a systematic breeding programme. It would also require introduction of germplasm from other countries which have been engaged in breeding of orchids from long time and have developed the cultivars suitable for international floriculture trade. Orchids have immense potential for its utilization in floriculture, herbal, pharmaceutical and tourism industry. The lack of major reproductive barriers provides a great scope for developing hybrid orchid cultivars with the changing preference of consumers. Majority of Indian orchid species bear large and attractive flowers and can be utilized for potted flowering plant production after proper selection and multiplication of desired genotypes.

Role of NRC for Orchids in conservation and sustainable utilization of orchid biodiversity

Since its inception, National Research Centre for Orchids engaged in conservation orchid biodiversity of the country. The Centre has conserved 350 species of orchids collected from tropical to temperate regions of the country at its Pakyong and Darjeeling Campus. The accessions of conserved species are being evaluated for various horticultural traits and elite germplasm lines are being registered with National Bureau of Plant Genetic Resources (NBPGR). For protection of rare, endangered and threatened (RET) species, the Centre is developing production and propagation protocols and planning to bring them under cultivation so that pressure of collection on natural habitats is reduced. The molecular techniques play a significant role in protecting the genotypes from bio-piracy. A programme on DNA fingerprinting of orchid species is being carried out which would be helpful in protecting the orchid biodiversity from illegal use. The live specimens conserved ex situ in orchidaria are always at the risk of genetic erosion due to poor adaptation of local conditions and/ or pests and diseases and improper management. The collections need to be systematically duplicated using multiple conservation strategies [4]. During 12th Five Year Plan, centre is planning to use supplementary conservation techniques like seed, in vitro conservation and cryopreservation for safe, sustainable and long-term conservation of orchid genetic resource.

NRCO may also take an active role in coordination with National Biodiversity Authority of India and Ministry of Environment and Forest in identification of orchid rich habitats and finding out causes of loss of orchid biodiversity and suggesting appropriate measures for their conservation for in situ conservation. Though, NRCO has been designated as Active Germplasm Site for Orchids under National Active Germplasm System

(NAGS) but conserving orchid germplasm at one or two locations appears to be a difficult task. Hence, NRCO is planning to coordinate with regional orchidaria in sustainable conservation and utilization of orchid germplasm. To respect and protect the knowledge of local communities related to biodiversity and secure sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources, initiatives needs to be taken to identify farmers and communities involved in conserving orchid biodiversity, to gain knowledge about Indigenous Technological Knowledge (ITK) regarding medicinal use of orchids and their scientific validation with the purpose of securing equitable share in benefits arising out of the use of orchid resources, and associated knowledge relating to use of orchids. After formation of Biodiversity Management Committee at local (panchayat) level, these bodies may be involved in benefit sharing process.

Breeding of orchids

Countries like Thiland, Malayasia, Singapore, Phillipines, Sri Lanka and Indonesia have established heir own orchid industries. Despite of availability a large number of species of orchids in India, commercial hybrids of orchid is not available in our country. History of orchid breeding is nearly 150 years old and more than 100,000 hybrids have been released in different genera of orchids mostly from the private nurseries and amateur orchid breeders of different countries. The wild species have little value in the international floriculture trade due to inferior flower shape, size and colour in comparison to modern day orchid hybrids. Besides, their promotion in trade will also endanger the wild habitat leading to the extinction of these species. Orchid breeding in India is still in nascent stage. Till date there is no single commercial orchid variety that has been notified by any variety release committee in India. About seventy hybrids of various orchid species have been registered with international registration authority by the breeders from both public and private sector. However none of them have entered in commercial cultivation domain. The current commercial cultivation of orchids in India is based on cultivars developed elsewhere in other countries like Netherland, USA, Australia, New Zealand, Thailand, Japan etc. Many of these hybrids involve several species in their background. Hence it is very difficult to obtain commercially viable orchid hybrids with primary crosses involving different species. Perennial life cycle, 3-4 years delay in flowering and lack of information on inheritance pattern of economically important traits further add to this difficulty. In the countries leading in orchid breeding, commercial hybrids are developed involving the advanced breeding lines/ commercial hybrids in the crossing programme. Orchid breeders in India have to use those advanced materials in their breeding programme to obtain any commercially viable hybrid. Intellectual property laws prevent any unauthorized use of planting materials/ parental stocks/ hybrids for developing new varieties/ hybrids and their commercial utilization. Hence procurement and introduction of breeding materials with appropriate denomination and parentage is desperately needed under appropriate international laws with Material Transfer Agreement (MTA) and Mutually Agreed Term (MAT). Prior Informed Consent (PIC) of concerned breeders and benefit sharing agreement is also required. These introduced materials may be then used in breeding programme and also multiplied and distributed to orchid growers if felt necessary.

Along with introduction, widening of genetic base and enhancement of gene pool through pre-breeding efforts should also be emphasized in order to develop a base for future breeders with indigenous breeding lines. To achieve this, a core set of germplasm collection have to be developed from the huge collection of orchid species available at both the centres of NRC for Orchids and then primary interspecific hybrids may be developed from this core collection. All these efforts will ensure the development of a strong mechanism of orchid breeding for India and help in science led development of Indian orchid industry.

A major advantage of orchid breeding is that it may combine the approach of conventional breeding methods (like hybridization), coupled with clonal selection. Orchids may be crossed very easily due to absence of major crossability barrier. Two parents (including standard commercial hybrids, species etc.) comprising complementary traits may be crossed. Due to highly heterozygous nature of the crop, the first filal generation (F1) behave as a segregating generation.

Any progeny showing desirable trait may be selected and then multiplied through apical meristem culture. After producing a large number of clones of the desired plant, the plants may then be evaluated in multi-location trial and identified for release and further multiplied in large scale for distributing to the growers. Besides hybrization, mutation and polyploidy breeding also finds significant place in orchid breeding. Even concept of seed propagated pureline orchids have been proposed by utilization of haploid breeding method [20].

In general, orchid seeds are of very minute size and devoid of endosperm. Hence they can't be propagated directly in soils/growing media. Need for mycorrhizal stimulus further complicates the situation. The seeds may be grown in tissue culture media under aseptic condition and raised to seedlings. Standard commercial hybrids

are highly heterozygous in nature and hence propagation through seeds is not possible. However, recently concept of purelines in orchid has also been proposed based on haploid breeding approach suggesting the possibility to develop seed propagated orchids [20]. With this protocol, application of a small amount of auxin in the reproductive column of orchid results in induction of haploid parthenogenesis. The haploid seedlings may be treated with colchicines to produce diploid pureline orchid plants. If any desirable pureline plant is obtained, it may be further multiplied easily through seed culture. This will also help to produce virus free seedlings which may revolutionize orchid cultivation worldwide. However the performance of the purelines can't be predicted as they may also show various degrees of inbreeding depression. If found so, these lines may then be used to produce commercial F1 hybrids and generation of doubled haploid mapping populations.

NRCO have initiated breeding programme of subtropical and temperate orchids for developing commercial hybrids with advanced exotic breeding materials/ hybrids with a strong scientific backup and due consideration to the prevalent IPR laws. NRC for Orchids initiated its breeding programme during 1998 and has developed few crosses during last 14 years (eg. Cymbidium lowianum x C. 'Show Girl' and its reciprocal cross; C. 'Oriental Legend' x C. 'Showgirl Cooksbridge' and its reciprocal; C. 'Sleeping Nymph' x C. 'Goldengirl' and its reciprocal etc. Protocols for *in vitro* seed culture and multiplication through tissue culture in various Cymbidium hybrids have also been developed successfully [Source: RPF documents, NRCO (1998-2011)]. In case of Cymbidium, several crosses have been attempted and segregating progenies are under evaluation [e.g. Cymbdium hybrid:
Sleeping Nymph × Cymbidium lowianum (Fig. 3)].

NRC for Orchids has also been assigned the responsibility of developing distinctiveness uniformity stability (DUS) testing guidelines for orchids. The DUS testing guidelines for three important genera namely Cymbidium, Dendrobium and Vanda has been finalized and notified by PPVFR Authority. The centre is expected to act as a centre for DUS testing of newly released varieties in the country. As three genera of commercially important orchids have already been notified under PPVFR act, the extant varieties and new cultivars from foreign countries may also be registered with PPVFR Authority and utilized for commercial cultivation in India.

Conclusion

The CBD recognizes the sovereign rights of the nations over their biological resources and reaffirms the authority resting with national governments in conservation and sustainable utilization of biodiversity. India is one of the largest reservoirs of orchid genetic resource in the world. Unfortunately this genetic wealth of the country is
vanishing at an alarming rate due to destruction, degradation, and shrinkage of natural habitats. Various conservation measures should be taken up with strong scientific backup to save genetic resources of orchids from extinction along with its sustainable utilization for floriculture trade.

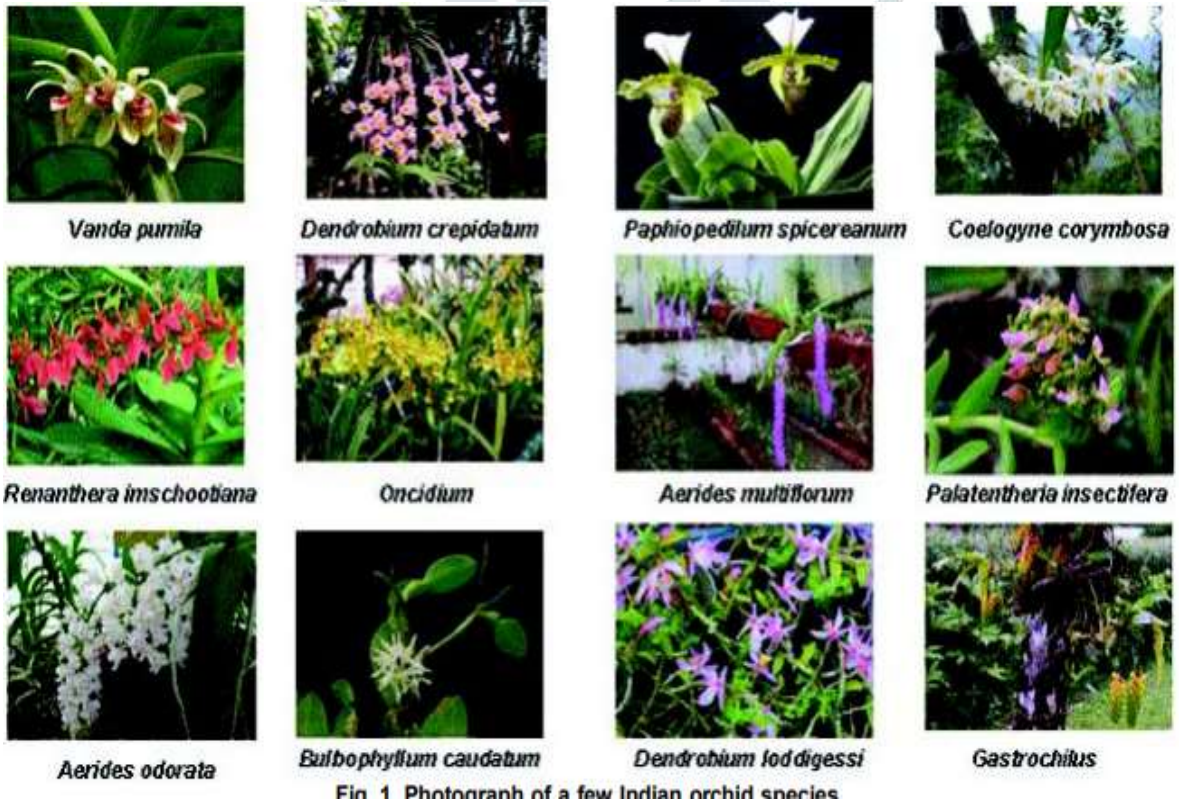

Fig. 1 Photograph of a few Indian orchid species

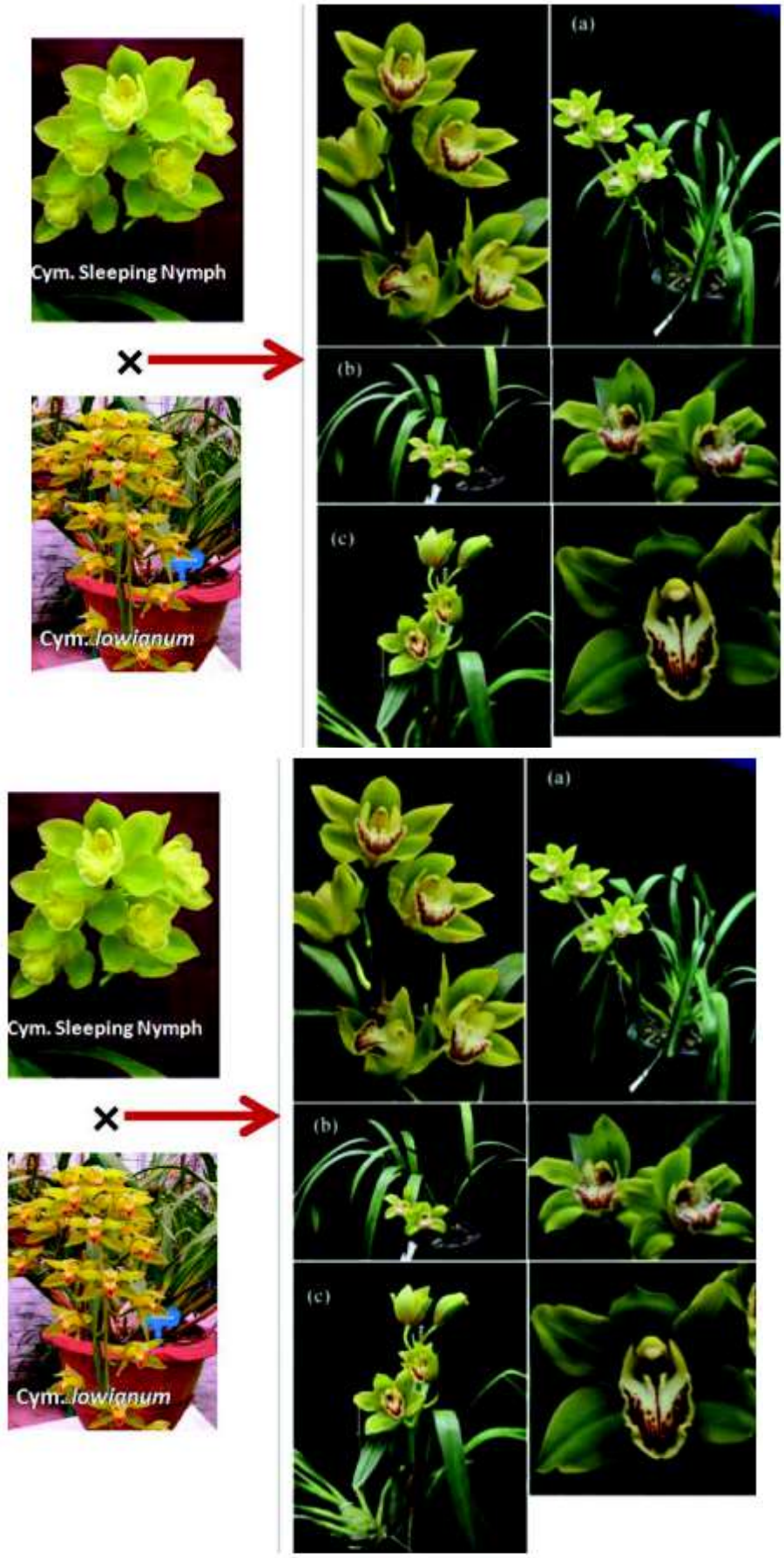

Fig. 3. Segregation pattern among the hybrid progenies of Cymbidium hybrid *Sleeping Nymph* x *Cymbidium lowianum*

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