

IMPORTANCE AND SCOPE OF ORCHIDS IN ANDHRA PRADESH

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Abstract

Indian economy is principally influenced by agriculture and allied activities. Orchids are known for their high ornamental value due to their magnificent and graceful flowers. Apart from their use as decorative materials and cut-flowers, they are being used for various purposes such as herbal medicines, source of phytochemicals and in aromatic products due to their pleasant fragrance. Potential medicinal value and possible orchid flower export for the subcontinent are not yet adequately explored and estimated. The state of Andhra Pradesh has good number of orchid taxa in all regions mostly in East Godavari and Visakhapatnam districts as an indicative of the extremes of moisture levels in the environment. A humid and warm atmosphere is congenial for the growth of most of the tropical orchids. Greenhouse is the most functional methodology for achieving the objectives of protected cultivation of orchids. Protected cultivation technique facilitates the production of orchids by providing complete controlled conditions. Some districts of Andhra Pradesh are suitable for the orchid production. The global demand for orchids creates possibilities for local cultivation of orchids apart from regular and sustainable harvest from wild stands.

Introduction

THE FAMILY Orchidaceae is one of the most ecologically and morphologically diverse families of flowering plants. This is one of the largest families amongst flowering plants in the world. The family includes 28,484 species, distributed in 850 genera in the world (Govaerts *et al.*, 2017). India houses about 1,256 species belonging to 155 genera, having 388 endemic species (Singh and Agrawala, 2019).

These plants are noted for their bewitchingly beautiful, long lasting flowers, widely differing in shape, size, colour and are known to have about 1.5 lakhs man made hybrids. These have varying habitats, including terrestrials, epiphytes, saprophytes, lithophytes, and subterranean species. Epiphytic orchids are prominent among the commercial types and dominate the trade (Janakiram and Baskaran, 2018). They are also classified as monopodials (stems having a vertical growth, non-branching, with aerial roots) and sympodials (stems having a horizontal growth, producing pseudobulbs in clusters, no aerial roots). Despite the diversity, only a small number of epiphytic genera like *Cymbidium*, *Dendrobium*, *Oncidium*, and *Phalaenopsis* are cultivated commercially.

Epiphytic orchids require free moving air all the times producing aerial roots, to absorb water and nutrients from the atmosphere. Both terrestrial and epiphytic orchids grow under varying levels of shade. Mostly epiphytic orchids require shade conditions. Plants grown under deep shade have good vegetative growth and poor flowering. Hence, shade and light regulations are very important operations for better flowering. A humid

and warm atmosphere is congenial for the growth of most of the tropical orchids. Better results are obtained when the atmospheric humidity is 50 to 80 per cent. Orchids require proper temperature for good growth and flowering. The Andhra Pradesh state holds great promise for commercial floriculture. Some studies revealed that orchids are mainly collected for medicinal purposes by locals and tribes in Narsipatnam, Talakona area, and Visakhapatnam. In these areas, orchids are best conserved through community based management. As the forest is a congenial habitat for orchids, it is believed that the tribals were the first community which got familiarity with these plants.

In India, the area under commercial cultivation of orchids, particularly tropical orchids like *Dendrobium* is limited to the Southern states and Maharashtra, whereas temperate orchids like cymbidiums are grown in North-Eastern states. Most of the produce is sold internally with meagre export. *Dendrobium* is one of the second largest genera of Orchidaceae which contains more than 1,340 species and possibly thousands of hybrids which are distributed throughout the world. *Dendrobium* plants vary in size, some being smaller and others large, robust specimens measuring over 1 m. The flower spikes can be above two feet tall with around twenty blooms on them. The flowers last for 6 to 8 wks and they make excellent cut flowers. They bloom in all the colours of the rainbow. Keeping in view of the high demand of orchids, their cultivation in protected conditions offers a great opportunity for sustainable employment generation for tribal people. *Dendrobiums* are available in a variety of colours. Protected cultivation of *Dendrobium* by the farmers at

their respective fields will practically expose them to the technology necessary for growing the orchids in Andhra Pradesh. The following are some of the floriculturally important orchid genera/hybrids:

Monopodials

Arachnis, *Aranda*, *Aranthera*, *Ascocenda*, *Mokara*, *Phalaenopsis*, *Renanthera*, and *Vanda*.

Sympodials

Cattleya, *Cymbidium*, *Dendrobium*, and *Oncidium*.

Bigeneric Hybrids

Ascocenda (*Ascocentrum* × *Vanda*)

Aranda (*Arachnis* × *Vanda*)

Aranthera (*Arachnis* × *Renanthera*)

Brassocattleya (*Brassavola* × *Cattleya*)

Doritaenopsis (*Doritis* × *Phalaenopsis*)

Laeliocattleya (*Laelia* × *Cattleya*)

Vandaenopsis (*Phalaenopsis* × *Vanda*)

Trigeneric Hybrids

Mokara (*Arachnis* × *Ascocentrum* × *Vanda*)

Brassolaeliocattleya (*Brassavola* × *Laelia* × *Cattleya*)

Varieties in Dendrobium

Purple and White: *Sonia 17*, *Sonia 28*, *Sonia Bom Jo*, and *Earsakul*

Purple: *Renappa*, *New Wanee*, *Sabine Red*, *Jurie Red*, *Master Delight*, and *Velvet Soft*

White: *Emma White*, *Fairy White*, *Kasem White*, *Nette White*, and *Snow White*

Pink: *Sakura Pink*, *New Pink*, *Lemon Glow*, *Banyat Pink*, and *Pink Cascade*

Yellow: *Sherifa Fatimah*, *Kasem Gold*, and *Tongchai Gold*

Magenta: *Deep Blush*

Hawaiian Beauty × *Kasem Pink*

Jay Swee King × *Jacqueline Concert*

Kioni Beauty × *Banyot Pink*

Scope for Promotion of Orchids in Andhra Pradesh

Cultivation in Suitable Agro-Climates

Deciduous moisture forest lands are suitable for orchid cultivation. In India, majority of uncultivated space is under problematic conditions of forest lands. Even a fraction of this space brought under greenhouse cultivation might turn out in substantial returns for the native inhabitants.

Greenhouses Around Massive Cities

The substantial demand persists for orchids in the world round the year in big cities, thus greenhouse cultivation in those areas is promoted to fulfill the market need.

Export

There is a high international demand for orchids. Promotion of greenhouse cultivation/protected cultivation of export orchids is going to be of definitely facilitating towards export promotion.

Greenhouses (GH) for Plant Propagation

Greenhouse technology is an appropriate approach for raising seedlings and cuttings that need management strategies. GH facility might increase the capability and quality of producing the planting material.

Earlier, Murthy *et al.* (2009) reported 39 species of orchids from Visakhapatnam district of Andhra Pradesh. Orchids like *Dendrobium aphyllum* (Roxb.) Fischer, *Eulophia epidendreae* (Retz.) Fischer, *Geodorum densiflorum* (Lam.) Schltr., *Habenaria* spp., *Luisia zeylanica* Lindl., *Malaxis rheedii* Sw., *Oberonia* spp., *Pholidota pallida* Lindl., *Vanda* spp. are present in this region. Raju *et al.* (2008) reported that the state of Andhra Pradesh has good number of orchid taxa [36 genera and 76 species (one cultivated, *i.e.* *Spathoglottis plicata* Bl.)]. Within the state, region-wise, the number of orchid taxa reported are 52 for Coastal Andhra, 27 for Rayalaseema, and 10 for Telangana. While the highest number of orchids recorded from Visakhapatnam district, the lowest score from Anantapur and it is an indication of the extremes of moisture levels in the environment. In life-form, slightly more than half of the orchids (51.9%) are epiphytes (with equal proportions of simple epiphytes, pseudobulb epiphytes, and chamerophytes) whilst the rest are terrestrial (48.1%). The latter are more diversified though a great majority are geophytes (amongst them 20 are tuber geophytes, 11 pseudobulb geophytes, 2 holomycotrophic rhizome geophytes, and 1 rhizome geophyte). These are indicative of the past temperate

climate of the region. There are orchids from Andhra Pradesh which share their distribution with Western Ghats on one hand and North-Eastern India on the other. *Habenaria ramayyana* Chary & J.J. Wood is the only orchid endemic to Andhra Pradesh.

A study conducted on the orchids of Eastern Ghats of Andhra Pradesh (Rao *et al.*, 2009) revealed the presence of 84 wild orchid species and 56 of them are known to encounter in Eastern Himalayan region of India. The study provides an enumeration of the 56 species, their growth form and distribution in the Eastern Ghats of Andhra Pradesh. Of the 56 species, 29 are epiphytes, 25 are terrestrial, and 2 are saprophytic. Karuppusamy *et al.* (2008) reported *Habenaria commelinifolia* (Roxb.) Wall. ex Lindl. for the first time as the flora of Andhra Pradesh from Mudendlakorava in Tirumala Hills, Chittoor district. Panda *et al.* (2008) found six species of orchids, *i.e.*, *Acampe rigida* (Buch.-Ham. ex J.E. Sm.) Hunt., *Dendrobium moschatum* (Buch.-Ham.) Sw., *Geodorum recurvum* (Roxb.) Alston, *Habenaria diphylla* Dalz., *Nervilia infundibulifolia* Blatt. & McC., and *Vanilla walkeriae* Wight as new for the state of Andhra Pradesh from East Godavari and Visakhapatnam districts. Occurrence of *Eulophia flava* (Lindl.) J.D. Hook. is being confirmed in the Eastern Ghats eco-region, collected from the forests of Kadapa in Andhra Pradesh (Rao *et al.*, 2010). *Sirhookera latifolia* (Wight) O. Kuntze has been reported for the first time for Eastern Ghats from Sambarikonda hill, Visakhapatnam district, Andhra Pradesh (Reddy *et al.*, 2007).

Ethnobotanical studies were carried out (Reddy *et al.*, 2005) during 1995-2001 in the Eastern Ghats region of Andhra Pradesh covering Chittoor, Kadapa, East Godavari, Guntur, Khammam, Krishna, Kurnool, West Godavari, and Visakhapatnam districts and the tribal populations. The studies brought to light the ethnic uses of 21 epiphytic and terrestrial orchids including *Acampe praemorsa* (Roxb.) Blatt. & McCann, *Bulbophyllum neilgherrense* Wight, *Crepidium acuminatum* (D. Don) Szlach., *Cymbidium aloifolium* (L.) Sw., *Dendrobium herbaceum* Lindl., *D. macrostachyum* Lindl., *Eulophia epidendreae* (Koenig) Schltr., *Geodorum densiflorum* (Lam.) Schltr., *Habenaria fursifera* Lindl., *H. longicorniculata* Grah., *H. plantaginea* Lindl., *H. roxburghii* Nicolson, *Luisia zeylanica* Lindl., *Malaxis rheedii* Sw., *Nervilia aragoana* Gaud., *N. plicata* (Andr.) Schltr., *Oberonia wightiana* Lindl., *Peristylus lawii* Wight, *Pholidota imbricata* W. J. Hook., *Vanda tesellata* (Roxb.) W.J. Hook. ex Don, and *V. testacea* (Lindl.) Reichb.f. Misra *et al.* (2008) reported 85 species belonging to 41 genera are known in Andhra Pradesh and all these species are distributed in parts of Eastern Ghats of Andhra Pradesh. Some works are published

by Benjamin and Murthy (2013) (flora of SV National Park reported 16 species, Madhava Chetty *et al.* (2008) (Flowering plants of Chittoor district reported 18 species), Mira *et al.* (2013) (13 species), Savithamma *et al.* (2009) (Orchids of Talakona). *Habenaria commelinifolia* (Roxb.) Wall. ex Lindl. (Karuppusamy *et al.*, 2008), *Liparis* spp. (Prasad *et al.*, 2010), 26 species (Prasad *et al.*, 2016), *Eulophia flava* (Lindl.) J.D. Hook. (Rao *et al.*, 2010), *Habenaria panigrahiana* S. Misra var. *parviloba* S. Misra (Sadasivaiah *et al.*, 2009), in Seshachalam hills, and Raju *et al.* (2008) provided a list of 77 species from Andhra Pradesh. *Thunia alba* var. *bracteata* (Lindl.) Reichb.f. as a new generic record for Andhra Pradesh from Narsipatnam forest division of Visakhapatnam district was reported (Reddy *et al.*, 2014). Prasad and Veeranjaneulu (2016) reported 27 species of orchids under 14 genera from Seshachalam Biosphere Reserve.

Prasad *et al.* (2016) reported that the Seshachalam Biosphere Reserve is represented with 27 species under 14 genera of epiphytes, lithophytes, terrestrial, and saprophytes. In the terrestrial forms, a total of 18 species are represented. Of these, the larger genera include *Habenaria* with 7 species followed by *Eulophia* with 5 species, *Liparis* with 2 species, and remaining genera *i.e.*, *Corymborkis*, *Geodorum*, *Goodyera*, and *Malaxis* each with single species. One saprophytic species *i.e.*, *Aphyllorchis monata* Reichb.f. was also found. Epiphytic or lithophytic forms are represented by 8 species. Of these, *Vanda* with 2 species followed by *Acampe*, *Bulbophyllum*, *Cleisostoma*, *Dendrobium*, *Liparis*, and *Taprobanea spathulata* (L.) Christ. with single species each.

Activities Undertaken

Efforts were also initiated at Dr. Y. S. R. Horticultural University so as to conserve the gene pool of orchids available in forests and the *ex situ* cultivation was also taken up with the following objectives: i) Conservation and improvement of threatened/endangered/endemic species of orchids; ii) Prevention of illicit removals through unscrupulous collectors; iii) Creation of awareness among public on the importance of orchids; iv) Standardization of cultivation practices for economically viable species suitable to different agro climatic zones/poly houses/shade net houses and cultivating them to meet the industry requirements and to enter the global market; v) Establishment of linkages/market tie-ups between the farmer/producer and the leading industry; vi) Creation of databank on existing orchids in wild by conducting systematic and regular assessment surveys; and vii) Utilization of information technology (IT) for trade improvement.

The project, as Center of Excellence for Protected Cultivation on Orchids at HRS, Chintapalli is designed to train tribal farmers in orchid cultivation and also to create marketing facilities through hand held extension mode. This will not only bring prosperity to the tribals but also uplift their socio-economic status. The tribals are caught in a situation where they are on the one hand losing command over the natural resources and are unable to take command over the new resources at their disposal on the other. Forests of Andhra Pradesh are abundant in orchids. Hence, the tribals are familiar with them and do not feel difficulty in handling the crop.

Limitations in Cultivation and Marketing of Orchids

Limitations in cultivation and marketing of orchids include: i) Non availability of sufficient quality planting material which is in demand; ii) No organized research setup for continuous recharge of scientific inputs to make their cultivation economically viable and more profitable; iii) Lack of improved varieties planting material, extension literature, organized training, quality testing at procurement, and trading centres with unscrupulous market handling; iv) Non availability of good agricultural practices for orchids along with lack of technically skilled man power; v) Lack of sufficient market potential, marketing channels, buy back guarantee for suitable orchid varieties; and vi) Lack of knowledge about edible orchids, medicinal aromatic orchids, and neutraceutical value of orchids.

Improvement Strategies

Improvement Strategies include: i) Reducing the number of intermediaries in the collection, distribution, and marketing chain; ii) Drastically increasing cultivable area for orchids to ensure consistent supply of large quantities of produce; iii) Improving the post collection handling, value addition, and product presentation; iv) Improving technologies for increasing production/productivity/pre and post harvest technologies; v) Encouraging investments on development of new technologies; vi) Undertaking more in depth global overview of the demand and supply of orchids; vii) Increasing subsidy on orchid plants/structures for increasing their production and supply; viii) Setting up of export promotion zones exclusively for orchids and orchid based herbal products in potential states; ix) Providing linkage between growers and orchid export companies to ensure marketability; x) Research on usage of fertilizers to orchids and their impact on freshness should be studied for encouraging cultivation of these plants on large scale; and xi) Encourage orchid

cultivation in the natural habitat, shade houses/protected structures in suitable areas.

The government of Andhra Pradesh and AP State Biodiversity Board have to take steps to develop botanical gardens in the hilly regions of the area for *ex situ* conservation of orchids. East Godavari and Visakhapatnam districts of Andhra Pradesh are the most suitable areas for orchids in their natural habitats and multiplication and commercial cultivation. Coffee and pepper cultivation is also a source to conserve old natural trees which are most suitable for conservation of epiphytic orchid diversity in their natural habitats. There is a need to take up micropropagation of rare, endangered, and endemic orchids for the *ex situ* conservation. Since the orchids are on the verge of entering into an escalating phase in the field of ornamental, pharmaceutical, neutraceutical, and aroma therapy, the market potential has become extensive which needs continuous upgradation of botanical raw materials, creating competitiveness for the domestic industry apart from entering the international market. The global demand for orchids creates possibilities for cultivation of orchids apart from regular and sustainable harvest from wild stands. To meet this emerging demands worldwide, knowledge regarding their cultivation, bringing new suitable areas under cultivation, value addition, proper pre and post-harvest handling techniques, processing knowledge, and standardization techniques to prolong shelf life are highly essential. In this connection, it is worthwhile to mention that efforts have already been made towards the mass propagation and conservation of some of the floriculturally and medicinally important RET (Rare Endangered and Threatened) orchids from NorthWestern Himalayas in India (Anuprabha and Pathak, 2020; Bhowmik and Rahman, 2020; Kumari and Pathak, 2020, 2021; Laldusanga *et al.*, 2021; Pathak and Verma, 2021; Sunita *et al.*, 2021; Thakur and Pathak, 2020, 2021; Vasundhra *et al.*, 2021) and The Orchid Society of India is making sincere efforts regarding creating awareness, understanding, popularizing, conserving, and propagating Indian orchids amongst masses. We still need to go a long way for value addition strategies, cultivation practices, post harvest handling procedures, and linkage between growers and orchid export companies to ensure marketability of Indian orchids.

Conclusion

Wild orchid species in Seshachalam Biosphere Reserve and Narsipatnam Forest Reserve in Andhra Pradesh need to be conserved through both *in situ* and *ex situ* methods. Habitat protection is the first line of defense

for protection of orchid species and also off site conservation such as germplasm collection, *ex situ* multiplication through *in vitro* propagation, and *in situ* conservation are the best options for the ecological restoration of orchid habitat in Andhra Pradesh. The orchids with botanical and economical value, which are habitat-specific growing in the moist deciduous and semi ever green forests of Northern Andhra Pradesh need *in situ* as well as *ex situ* conservation for their survival and ecological balance in nature. The major threats are habitat destruction and illegal harvesting, resulting in biodiversity loss. For the conservation of orchids, there is an urgent need to protect the microclimate zones and undisturbed forests.

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