Ecologically and medicinally important Orchids and their conservation strategies

Jaydeep Kumar Sahu[1], Rani Jatav[2], Nidhi H. Joshi[3], Sugimani Marndi[4] and Sanjeet Kuamr[4*]

[1]Department of Dravyaguna, SSCASRH, Sri Sri University, Cuttack, India
[2]Department of Rog Nidan Evum Vikriti Vigyan, SRS Ayurvedic Medical College, Agra, Uttar Pradesh, India
[3]Department of Life Sciences, Dr. Subhash University, Junagadh, Gujarat, India
[4]Ambika Prasad Research Foundation, Odisha, India
*Correspondence Author's Email-Id: sanjeetaprf@gmail.com

Abstract: Wild orchids are highly appreciated because of their sheer beauty and variety. It is also ecologically important as they are a climatic indicator and indicate a healthy forest, as well as having medicinal values. Due to their beneficial character, orchids are over-exploited for trading purposes and fall under different threatened categories. Keeping this in view, an attempt has been made to document the medicinally and ecologically important orchids. Literature and field surveys were carried out. Results revealed that *Vanda tessellata*, *Bulbophyllum careyanum*, *Vanda testacea*, *Acampe praemorsa*, etc. are used as medicinal agents that cure diseases like rheumatic pain, stomach disorders, fever, etc. It was noticed that most orchid populations are declining, which becomes a major concern. The authors present here the medicinal uses and ecological significance of wild orchids, along with their conservation strategies.

Keywords: Medicinal uses, climate indicator, over – exploitation, trading purpose, industrial uses

Introduction: Orchids have been attracting botanists, naturalists, and ecologists for a long time due to their incredible range of diversity and high economic value. Orchidaceae is a member of the Asparagales, an order of monocotyledonous flowering plants that also includes asparagus. In India, about 1300-1500 orchids are documented (Singh et al. 2019). In Odisha state, a total of 160 orchids are documented by Dr. Sanjeet Kumar (Kumar et al. 2021). Orchid flowers are mono-symmetrical. This means that both halves of the flower are like mirror images. Orchids are important due to certain factors like ecological aspects, medicinal value, food value, economic value, ornamental value, and cultural value. They are mostly found in dry to moist deciduous forests. Three types of orchids are mainly identified that is epiphytic, terrestrial, and saprophytic (Plate 2). Orchids that are epiphytic possess aerial roots. These aerial roots contain a spongy tissue called velamen that provides water and nutrients from the atmosphere (Plate 1). Orchids are important for ecological aspects because they are somehow interlinked with mosses, ferns, tree mushrooms, and different types of pollinators. In some tribal areas, orchids are used for medicinal purposes, as *Bulbophyllum careyanum* is consumed to treat stomach diseases; *Vanda tessellata* leaf is used to treat cuts and wounds; and *Rhynchostylis retusa* is used to treat cuts and wounds.

Plate 1: Velamen in epiphytic orchid

Plate 2: Habit and habitat of Orchids (a) Epiphytic orchid, (b) Terrestrial orchid

Orchids are also used for economic purposes, as in many wedding areas, orchids are used for decorative purposes, like in bouquets for reception centrepieces and home decoration. Ecologically, it is important because in terrestrial orchids, without the nutrients from the mother plant, orchid seeds need help from the environment in the form of special fungi. In order to

germinate in epiphytic orchids, they take nutrients and water from the air without harming their host plant. Some orchids have a symbiosis with these fungi, and as soon as the orchid fully develops leaves, it gives back nutrients to the fungus, rewarding it for its initial help. Nowadays, orchids are diminishing due to certain specific factors, which are habitat loss, land clearance for urbanisation, overexploitation of medicinal orchids, and illegal trading. These have been the major threats for most of the habitat. Therefore, an attempt has been made to document the ecological importance & medicinal value of orchids. Authors have also discussed here on the conservation strategies to restore such species before they go extinct.

Methodology: The literature and field survey were carried out in 2022–2023 in selected areas of India (Odisha and Jharkhand). The semi-structured questionnaire with a passport data form was carried out. For further verification, a cross-question was conducted on the mode of use of medicinal orchids (Plate 3). The presented species was identified by the Authors.

Plate 3: Field survey in Odisha state

Results and discussion: The results revealed that, commonly, about 34 orchids have medicinal uses. Out of 34, 21 epiphytic orchids and 13 terrestrial orchids are noticed (Plates 4 and 5). The recorded mode of use was by paste, decoction, juice, and eating raw, especially the pseudobulb or bulb (Table 1). Specifically, the plant part is used, like the root, leaf, pseudobulb, or whole plant. Orchids are indicators of a healthy ecosystem. From the survey, it is revealed that, ecologically, orchids are important due to certain factors such as mosses, lichen, tree mushrooms, and ferns for food and nutrition (Plate 6). Orchids and trees are referred to as commensalism. Orchids and mycorrhizal fungi have symbiotic associations where orchid stage is dependent on specific fungi. It is also important for some faunal and insect species like

spiders, mantises, insects, the Indian giant squirrel, bees, and moths (Figure 1; Plate 7). Apart from its ecological value, it holds enormous medicinal value for curing many diseases. As per a survey, it was concluded that in Odisha state, the tribal communities use *Vanda tessellata* as a medicinal plant to cure cuts and wounds (Figure 2). Some researchers reported on medicinal values in 2021. Kumar et al. reported the diversity of orchids in Odisha. In 2015, De et al. reported a medicinal and aromatic orchid. In 2019, Swain et al. reported about the orchids in Odisha. In 2020, Kumar and Kumar reported on the medicinal orchids of Jharkhand. In 2022, Chakraborty reported some medicinal uses of orchids in India. In 2023, Choudhary et al. reported the medicinal orchids available in India.

Table 1: Medicinally important orchids

Botanical name	**Common name**	**Flowering & fruiting period**	**Medicinal Uses**
Acampe praemorsa (E)	Brittle tiger orchid	May- January	Arthritis
Aerides multiflora (E)	The multiflowered Aerides	June-September	Cuts and wounds
Aerides odorata (E)	The fragrant Aerides	June- November	Joint pain
Bulbophyllum careyanum (E)	Carey's Bulbophyllum	October- March	Constipation
Cymbidium aloifolium (E)	Aloe leafed Cymbidium	April – July	Fever
Cymbidium macrorhizon (T)	The long Rhizome Cymbidium	June - August	Boils
Dendrobium aphyllum (E)	Hooded orchid	February– October	Sore throat
Dendrobium crepidium (E)	The shoe lip Dendrobium	March- November	Bones
Dendrobium formosum (E)	Giant flowered Dendrobium	May– October	Antitumor activity
Dendrobium macrostachyum (E)	Fringed tree orchid	April- July	Earache
Dendrobium moschatum (E)	Musky smelling Dendrobium	May- July	Immunity booster

Dendrobium regium (E)	The Royal Dendrobium	April- March	Anemia
Dendrobium transparens (E)	The translucent Dendrobium	April - August	Dislocated bones
Geodorum densiflorum (T)	Pink nodding orchid	April – July	Diabetes
Geodorum laxiflorum (T)	Shepherds' crooks	June – July	Menstrual cycle
Habenaria commelinifolia (T)	The Commelina like leafed Habenaria	August- October	Immunity
Habenaria furcifera (T)	The fork carrying Habenaria, green Habenaria	August- September	Insect bites
Habenaria marginata (T)	Golden yellow Habenaria	September- October	Ulcer
Habenaria plantaginea (T)	Plantain Habenaria	August-October	Immunity
Liparis odorata (T)	Lish twin - bulb lip	May - August	Ulcer
Luisia zeylanica (E)	Suta rasna	March- August	Food poisoning
Nervilia concolor (T)	Tall shield orchid	May - July	Pneumonia
Nervilia crociformis (T)	Trembling nervilia	May - June	Asthma
Nervilia plicata (T)	Velvet shield orchid	March - June	Diabetes
Oberonia falconeri (E)	Falconer's Oberonia	August - October	Bone fractures
Papilionanthe teres (E)	Terete leaf vanda	February - June	High fever
Pelatantheria insectifera (E)	The insect bearing Pelatanthera	August - October	Inflammation

Peristylus constrictus (T)	The Constricted Peristylus	July - August	Malaria
Peristylus lawii (T)	Law's Peristylus	July - August	Insect bites
Pholidota imbricata (E)	Rattlesnake orchid/ Bada patra rasna	March - August	Arthritis
Rhynchostylis retusa (E)	Fox tail orchid / Ponari	May – July	Gastric problem
Smitinandia micrantha (E)	The small flowered Smitinandia	June - August	Food poisoning
Vanda tessellata (E)	The lattice like patterned flower Vanda	June - July	Cuts and wounds
Vanda Testacea (E)	The brick red Vanda	June - July	Asthma

(E: Epiphyte; T: Terrestrial)

Plate 4: Some epiphytic orchids a) *Dendrobium formosum,* b) *Dendrobium herbaceum,* c) *Rhynchostylis retusa,* d) *Smitinandia micrantha,* e) *Papilionanthe teres,* f) *Pholidota imbricata*

Plate 5: Some terrestrial orchids a) *Zeuxine gracilis,* b) *Zeuxine flava,* c) *Habenaria marginata,* d) *Habenaria commelinifolia,* e) *Habenaria furcifera,* f) *Epipogium roseum*

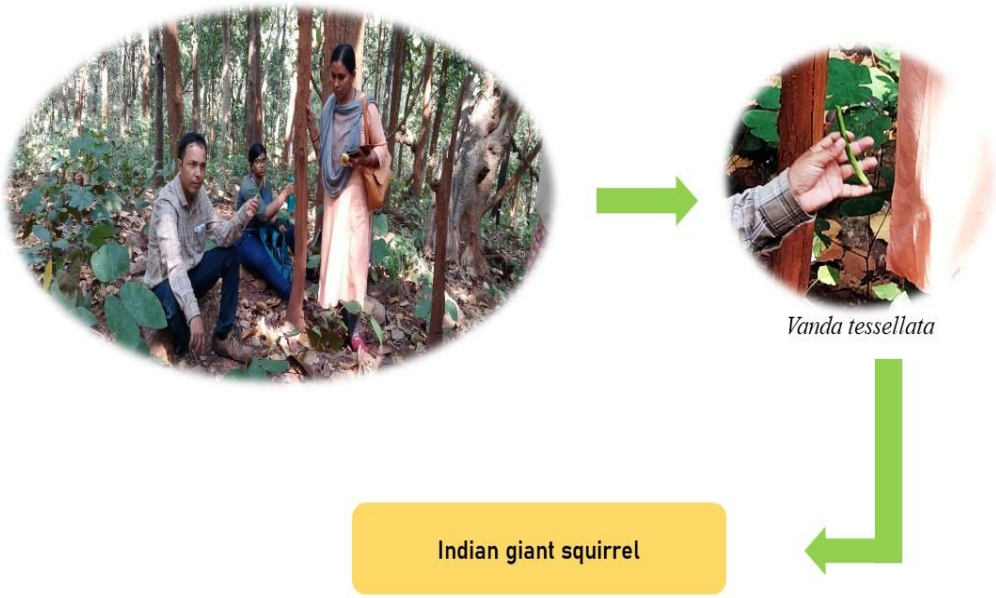

Figure 1: Indirect evidence of tender leaves of *Vanda tessellata* is consumed by Indian giant squirrel

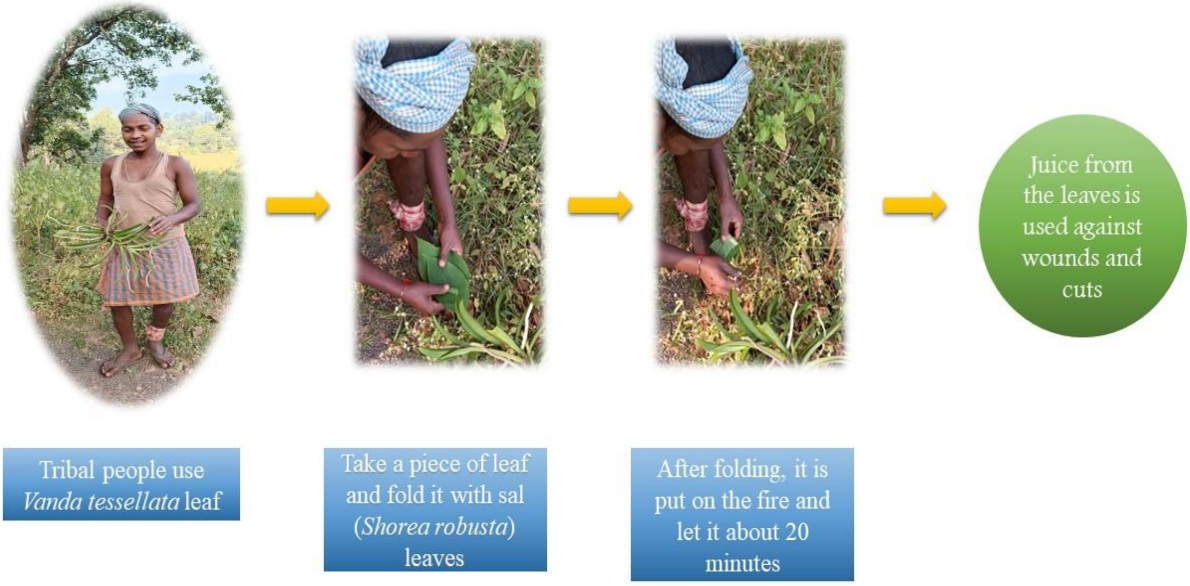

Figure 2: Tribal people use *Vanda tessellata* for medicinal uses

Plate 6: Ecological importance of orchids in association with other species a) Orchid relationship with lichen, b) Orchid relationship with mosses, c) Orchid relationship with tree mushroom, d) Orchid relationship with ferns

Plate 7: Orchid relationship with other insect species a) Insect takes water from velamen, b) Spiders web on orchids, c) Mantis on orchid

Authors have also restored many common orchid species for conservation purposes (Figure 3) which should be initiated in many places.

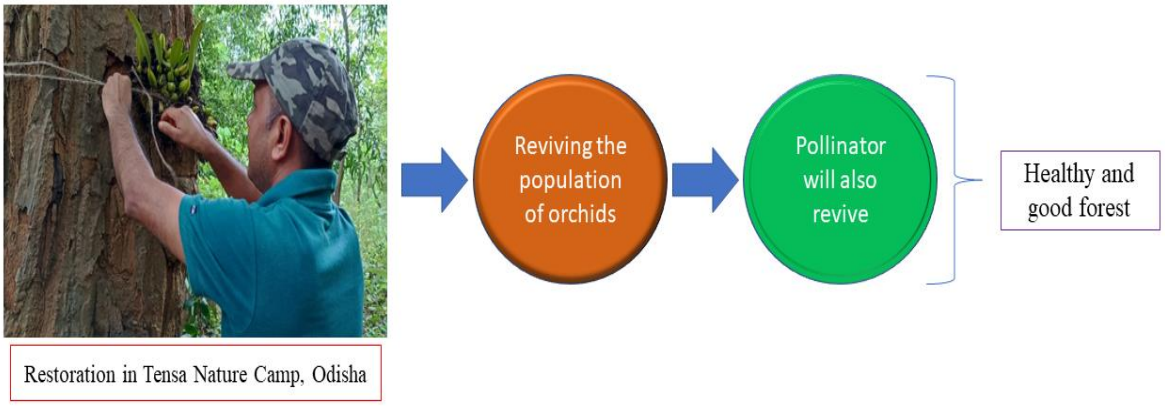

Figure 3: Conservation strategies by restoration process

Conclusion: Orchids are becoming threatened species due to overexploitation, habitat clearance for urbanisation, illegal trading, climatic change, pollution, mining activities, overgrazing, and overcollection. Several species that have been reported to have medicinal properties have not been collected or reported, thus indicating their possible disappearance due to habitat changes and many other factors. As most orchids are pollinated by insects, moths, and bees, the depletion of the population of pollinators may also lead to the depletion of the

population of orchid species. Therefore, we need to document the medicinal and ecological values to conserve orchid species.

References

Chakraborty A, Pal N, Thanvi HA, Dhal A, Devi C, Kumar S, and Mishra S. (2022). Medicinally important common orchids of India. Medico-biowealth of India. 5:25- 29.

Choudhary D, Mashkey VK, Goutam E, Shrivastava M, Rawat M, Kumari A, and Tripathi V. (2023). Medicinal orchids: Traditional uses and recent advances. Annals of Phytomedicine. 12(1): 203-211.

De LC, Rao AN, Rajeevan PK, Pathak P, and Singh DR. (2015). Medicinal and aromatic orchids – an overview. International Journal of Current Research. 7(9): 19931-19935.

Kumar A and Kumar S. (2020). Some medicinal orchid species of Jharkhand, India. Journal of Biodiversity and Conservation. 4(4): 398- 404.

Kumar S, Mishra AK, Singh RK, and Kumar SN, and Marndi S. Orchids of Bonai Forest Division (Pictorial guide). 1-77.

Kumar S, Mishra S and Mishra AK. Diversity of orchid species of Odisha state, India. With note on the medicinal and economic uses. Richardiana. 5: 1-26.

Singh SK, Agrawala DK, Jalal JS, Dash SS, Mao AA and Singh P. (2019). Orchids of India- A pictorial guide. Botanical Survey of India, Kolkata. Pp 1-548.

Swain SR, Devi RS, Routray D, Kumar S and Dhal NK. (2019). Orchids: an indispensable wealth of Odisha. Journal of Biodiversity and Conservation. 3(1): 170- 172.