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The Healing Orchids of Rarh-Bengal, India: Diversity and Traditional Knowledge

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ABSTRACT: Orchidaceae is one of the most highly evolved and fascinating families among angiosperms. It's unique floral structure not only attracts pollinators, but also captivated human interest for centuries. Additionally, orchids possess significant medicinal properties that have been recognized since the Vedic era. The Rarh region of West Bengal, India is distinct for its unique physio geographical characteristics and diverse tribal communities. Due to their specialized floral structures, it becomes an important and most precious ornamental group of plants. Orchids contribute significantly to biodiversity and also used in traditional medicinal practices. Present study represents on the documentation of orchid diversity in the region with reference to its ecological significance through field survey and collected the informations regarding their medicinal applications, highlighting the need for conservation efforts.

Keywords: Enumeration, Medicinal, Orchidaceae, Rarh-Bengal, West Bengal.

INTRODUCTION

Orchids are incredibly diverse and alluring plants, found in abundance in nearly every region worldwide except polar and arid desert environments (Pant, 2013; De & Singh, 2015; De *et al.*, 2015; Zhang *et al.*, 2018). The name Orkhis was first introduced by Theophrastus around 300 B.C., while the term Orchidaceae was coined by Carl Linnaeus in the year 1737 and later formally established by Antoine Laurent de Jussieu in the year 1789 (Anghelescu *et al.*, 2020; Dressler, 1993; Hegde, 2005). In India, orchids have been recognized since the Vedic period, with *Vanda tessellata* and *Flickingeria macraei* mentioned in the Rigveda and Atharvaveda for their medicinal properties (Ninawe & Swapna, 2017). The family Orchidaceae is one of the most widespread and ecologically significant group of flowering plants. It is the second-largest family within Liliopsida, encompassing *ca.* 25,000–35,000 species across under 900 genera worldwide (Cribb *et al.*, 2003), contributing about 8% of angiosperm diversity. Out of six perianths of the flower, outer three sepaloid and inner three petaloid, one of which is modified into a specialized structure called the labellum. Another distinctive feature of this family is the presence of Gynostemium, which is the Pollinia bearing unique central column of a flower formed by the fusion of androecium and gynoecium. Pollinia is actually the modified anther. Orchids are highly valued not only for their intricate and striking flowers but also for their extensive use in traditional medicine (Handa, 1986). However, the effects of climate change and overharvesting for ornamental and therapeutic purposes have placed many species at risk. As of 2017, the IUCN Global Red List included 948 orchid species, with 56.5% classified as threatened (De, 2020).

Orchidaceae is the largest family of higher plants in India, with its distribution primarily concentrated in the Eastern and Northeastern Himalayas, the Northwestern Himalayas, Peninsular India, and the Andaman and Nicobar Islands (De, 2020). India is home to approximately 1,300 orchid species belonging to 140 genera (Bhunia *et al.*, 2021), representing about 5.98% of the global orchid flora and 6.83% of India's total angiosperm diversity (De, 2020). Orchids in West Bengal are primarily concentrated in North Bengal, though a few species are also found in the southern region (Mitra *et al.*, 2020). Within South Bengal, the Rarh region stands out as a significant center of orchid diversity. Orchids in this region exhibit both epiphytic and terrestrial growth habits, with commonly found species including *Vanda tessellata* and *Dendrobium aphyllum.* Epiphytic orchids are primarily found growing on the trunks of *Shorea robusta* and *Diospyros melanoxylon,* whereas terrestrial orchids thrive in the shaded understory of evergreen forests or grasslands. Beyond their ecological and economic significance, orchids play a crucial role in both biodiversity and traditional medicinal practices. Though fragmentary district wise new reporting and floristic works of this region have been published previously (Mandal & Nandi 2012; Karmakar & Rahaman, 2022; Mandal *et al.*, 2022; Paul & Pati, 2023), but still now there is no comprehensive cumulative work on orchid diversity along with their distribution and medicinal uses have not been published yet. This research documents the region's orchid diversity through field surveys and

explores their medicinal uses, emphasizing the importance of conservation efforts.

STUDY AREA: Rarh region of West Bengal is well known for its physio-geographical characters, which lies between the latitude of 21°39′43″ N to 24°35′51″ N and longitude of 85°49′27″ E to 88°28′43″ E. This region is surrounded by the 'Ganges delta' to the East and the 'Choto-Nagpur plateau' to the West. It covers 6 districts of West Bengal (Fig. 1) *viz.* Bankura, Birbhum, Jhargram, Paschim Bardhaman, Paschim Medinipur, and Purulia. The Chota Nagpur Plateau in West Bengal includes parts of Purulia, Bankura, and Paschim Medinipur, acting as a transition zone to the Gangetic Plain. It features a rugged, forested landscape with hills and valleys, and is one of India's least explored biogeographic regions. Covering about 120,000 km², it consists of ancient Precambrian rocks and Gondwana formations. Geologically, it is part of the Deccan Plate, which collided with Eurasia millions of years ago (Haines, 1910; Kumar *et al*., 2007).

MATERIAL AND METHODS

Extensive field surveys were conducted successfully from October, 2022 to March, 2024 for the documentation of the orchid flora through random collection across various vegetation types in the selected study areas at different seasons. A significant challenge was locating specimens in their reproductive stage (flowering only) due to the diverse flowering seasons and distribution patterns of each species. Fresh specimens were collected from different locations, placed in zipper bags, and transported to the laboratory for identification and herbarium preparation. During field trip the ecological details, including natural habitat, host plants, and flowering and fruiting periods, were recorded. Field images of the specimens were captured using Nikon D3400 and D7000 cameras. In the laboratory, the collected specimens were identified by consulting the available literature (Malick, 1977; Hooker, 1890; Haines, 1910 & 1924; Prain, 1903; Sanyal, 1994; Panda & Das, 2004; Kumar *et al.*, 2007), and species nomenclature was verified using authoritative online databases such as Plants of the World Online (https://powo.science.kew.org) and the International Plant Names Index (https://www.ipni.org). Herbarium specimens were prepared using the standard herbarium method (Jain & Rao, 1976) and deposited at the Uluberia Botanical Institute Herbarium (UBIH). After successful identification, reviewing the medicinal properties of these orchids.

RESULT AND DISCUSSION

In the present study the authors reported 29 species of Orchidaceae under 16 genera along with their common name, flowering, fruiting time, and habitat of Rarh-Bengal region in West Bengal (Table. 1). Among them, 12 species are epiphytic and 17 species are terrestrial in nature (Fig. 2). Most frequently distributed genus in the concerned region is *Eulophia* which represents six species *viz., E. diffusiflora, E. explanata, E. graminea, E. nuda, E. ochreata,* and *E. picta,* followed by the genus *Habenaria* (representing five species viz. *H. commelinifolia, H. digitata, H. marginata, H. plantaginea, and H. reniformis*)*; Aerides; Dendrobium; Nervilia; Vanda*; *Acampe; Cymbidium; Didymoplexis; Luisia; Oberonia; Pelatantheria; Peristylus; Rhynchostylis; Tropidia*, and *Zeuxine* (Fig. 3). Throughout the survey, it was observed that the diversity of orchids was rich in Ajodhya hills of the district Purulia. Medicinal value of the Rarh-Bengal orchids has also been represented in Table 2, whereas the useful parts of different Rarh-Bengal orchids used for treatment has been represented in Fig. 4. The diseases related to Sexual disorders are the Maximum treated in the Rarh region of Bengal by the orchid (Fig. 5).

The presence of Gondwana substrates, the Deccan Plateau, and ancient Precambrian rocks contributes to the unique floristic composition of this region. The plateaus of Northeast India, along with the Western Ghats and Eastern Himalayas, are recognized as orchid biodiversity hotspots, with the Chota Nagpur Plateau serving as a biogeographic junction (Kumar *et al*., 2007; Kumar & Rawat, 2008). In the Jharkhand portion of Chota Nagpur, 64 orchid species have been recorded, five of which are endemic to the region (Kumar & Rawat, 2008). The present study documents 29 orchid species from the Rarh region, representing a significant addition to the existing knowledge contributed by earlier works on local orchid flora. Previous studies by Manoranjan *et al*. (2020); Chakraborti *et al*. (2021); Islam *et al*. (2023) reported 14, 27, and 18 species, respectively from this area. Consistent with the findings of Manoranjan *et al*. (2020), several species—*Acampe praemorsa, Aerides multiflora*, *Aerides odorata*, *Dendrobium macrostachyum*, *Luisia tristis*, *Peristylus constrictus*, and *Rhynchostylis retusa* —were found to be restricted to hilly terrains. *Zeuxine strateumatica* was observed only in grasslands near the foothills, such as those in Bandwan. Additionally, *Cymbidium aloifolium*, *Dendrobium macrostachyum*, *Didymoplexis pallens*, *Eulophia explanata*, *E. graminea*, *E. nuda*, *E. ochreata*, *E. picta*, certain species of *Habenaria*, and *Pelatantheria insectifera* are primarily confined to hill regions and exhibit limited distribution within this area. In contrast, species like *Vanda tessellata*, *Tropidia curculigoides*, *Dendrobium aphyllum*, and *Oberonia falconeri* were found to be very common and widely distributed throughout the area.

Due to their significant medicinal value and ornamental appeal, many orchid species are frequently harvested by local communities for traditional medicine and home decoration. The Rarh region is also well known as a "fire forest" because of its dominance by vibrant species such as *Butea superba, Butea monosperma, Bombax ceiba,* and *Erythrina variegata*. However, biodiversity in this region has been severely impacted by development projects, such as the construction of a dam in the Ajodhya Hills. At the same time, the region's natural beauty has led to a steady rise in tourism, with locations like the Ajodhya Hills and its adjoining areas, Garh Panchakot Hills, Baghmundi, and

Susunia Hills experiencing rapid development. This expansion, driven by agriculture and illegal construction, has become a major cause of deforestation. Furthermore, invasive plant species such as *Parthenium hysterophorus*, *Lantana camara*, *Mikania micrantha*, *Eucalyptus hybrids*, and *Acacia auriculiformis* are contributing to habitat degradation, significantly threatening native flora, including orchids. These factors combined are leading to a steady loss of orchid habitats. On the other hand, climatic change also affects the natural habitat of orchids.

This is a critical time to prioritize the conservation of existing orchid species in the region. According to the IUCN (2021), conservation refers to the protection, care, management, and maintenance of ecosystems, habitats, wildlife species, and populations, whether within or outside their natural environments, to ensure their long-term survival. In India, several initiatives have been undertaken to conserve rare, endangered, and threatened orchids by organizations such as the Botanical Survey of India, State Forest Departments, the Indian Council of Agricultural Research, and other governmental bodies. Similarly, conservation strategies include the establishment of orchidarium, orchid trails, and orchid reserves across different parts of this region have to be implemented.

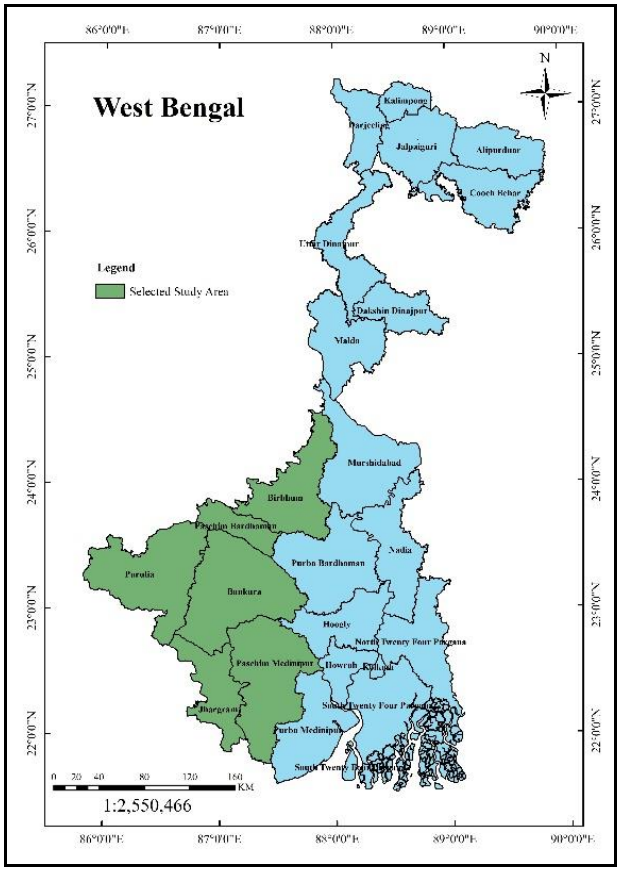

Fig. 1. The Study area Rarh-Bengal.

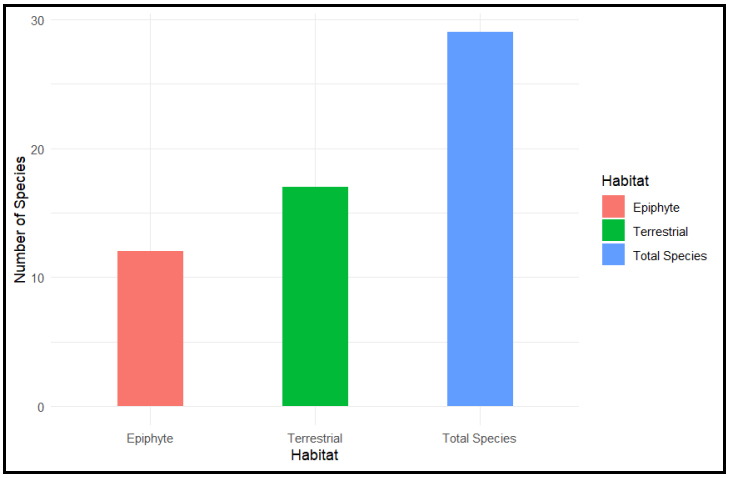

Fig. 2. Habitat distribution of orchids.

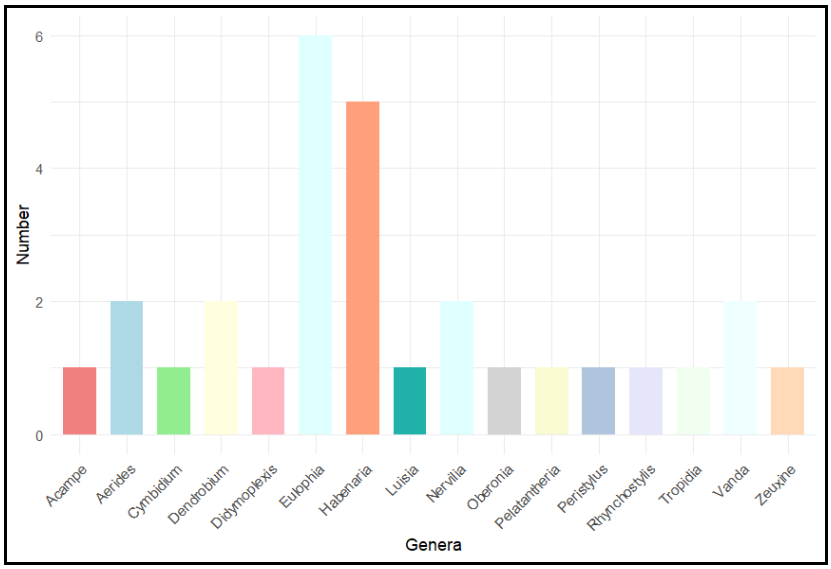

Fig. 3. Species distribution for genera.

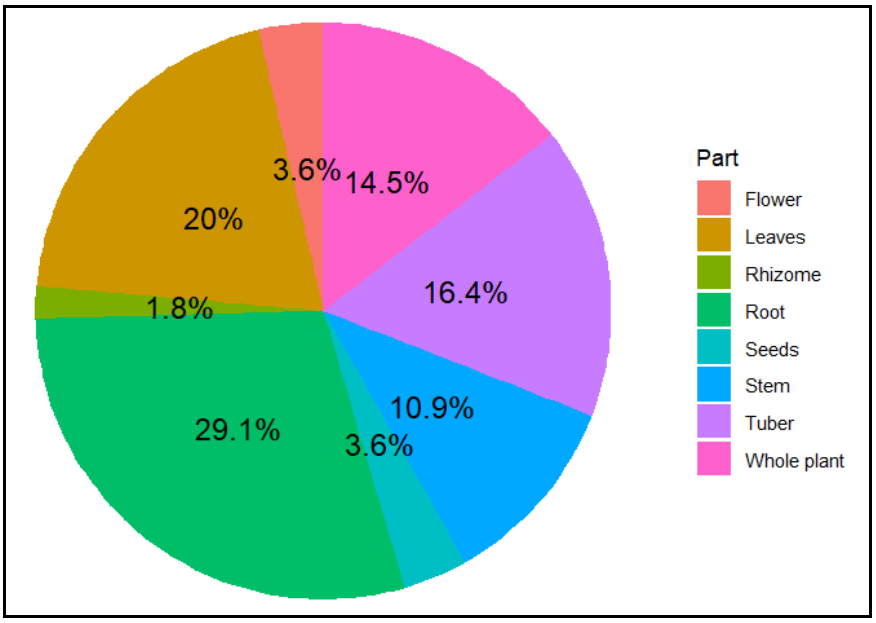

Fig. 4. Uses of Plant part.

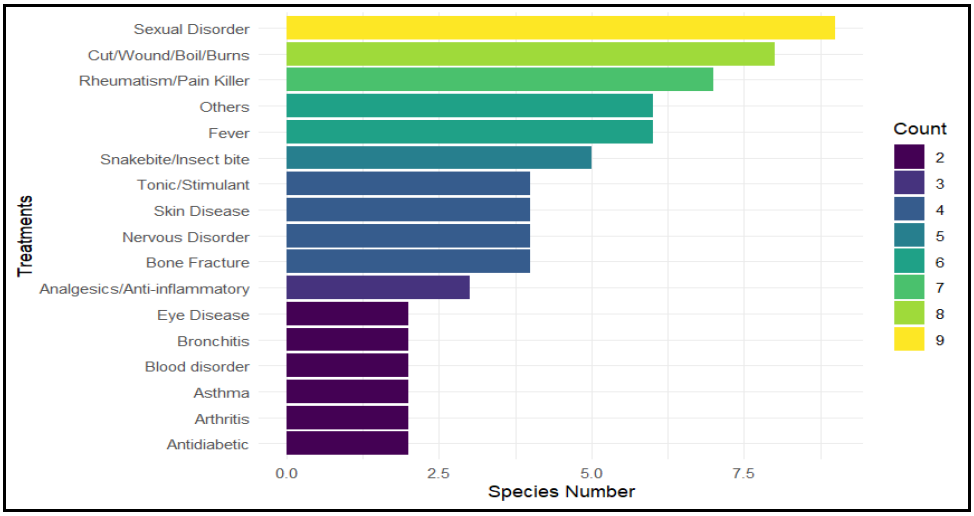

Fig. 5. Plant vs. Disease treated.

Table 1: Diversity of Orchid species in Rarh-Bengal.

Sr. No.	Binomial Name	Common Name	Habit	Localities	Status	Flowering and Fruiting Time
1.	*Acampe praemorsa* (Roxb.) Blatt. & McCann	Rasna (Sanskrit)	Epiphyte	Ausgram Forest, Ayodhya Hill, Joychandi Hill	Common	May-Aug
2.	*Aerides multiflora* Roxb.	Draupadi puspa	Epiphyte	Ayodhya Hill, Matha Forest	Common	May-July
3.	*Aerides odorata* Lour.	Pargasa	Epiphyte	Ayodhya Hill	Common	May-July
4.	*Cymbidium aloifolium* (L.) Sw.	Aloe leaf cymbidium	Epiphyte	Matha Forest, Ayodhya Hill	Rare	July-Feb
5.	*Dendrobium aphyllum* (Roxb.) C.E.C.Fisch.	Fasia mach (Chakma)	Epiphyte	Kharagpur, Sonajhuri Forest	Very Common	Mar-May
6.	*Dendrobium macrostachyum* Lindl.	Radam	Epiphyte	Ayodhya Hill	Rare	April-June
7.	*Didymoplexis pallens* Griff.	Crystal bells	Terrestrial	Bhadutala Forest,	Rare	June
8.	*Eulophia diffusiflora* M.W.Chase, Kumar & Schuit.	Lax-flowered Swamp Orchid	Terrestrial	Matha Forest, Ayodhya Hill, Ghagra	Common	June-July
9.	*Eulophia explanata* Lindl.	Flattened Eulophia	Terrestrial	Ayodhya Hill	Rare	May-June
10.	*Eulophia graminea* Lindl.	Dudhiya	Terrestrial	Ayodhya Hill	Rare	Mar-April
11.	*Eulophia nuda* Lindl.	Amarkand	Terrestrial	Ayodhya Hill	Rare	June-July
12.	*Eulophia ochreata* Lindl.	Amarkand	Terrestrial	Ayodhya Hill, Belpahari	Rare	June-Oct
13.	*Eulophia picta* (R.Br.) Ormerod	Shepherd's crook orchid	Terrestrial	Ayodhya Hill	Rare	Dec-Mar
14.	*Habenaria commelinifolia* (Roxb.) Wall ex Lindl.	Dev Sunda	Terrestrial	Ayodhya Hill	Rare	Aug- Sept
15.	*Habenaria digitata* Lindl.	Green Habenaria	Terrestrial	Ayodhya Hill	Rare	Aug- Dec
16.	*Habenaria marginata* Colebr.	Golden yellow habenaria	Terrestrial	Ayodhya Hill, Baghmundi Hill	Rare	July- Nov
17.	*Habenaria plantaginea* Lindl.	Kusuma gadda	Terrestrial	Ayodhya Hill	Rare	Oct-Dec
18.	*Habenaria reniformis* (D.Don) Hook.f.	Gnome's cap Orchid	Terrestrial	Ayodhya Hill	Rare	July- Dec
19.	*Luisia tristis* (G.Forst.) Hook.f.	Velvet orchid	Epiphyte	Ayodhya Hill, Matha Forest	Common	Feb-Mar
20.	*Nervilia concolor* (Blume) Schltr.	Tall shield orchid	Terrestrial	Ayodhya Hill, Chemtaburu hill	Common	May-Oct
21.	*Nervilia plicata* (Andrews) Schltr.	Satramdumpa	Terrestrial	Ayodhya Hill	Rare	June
22.	*Oberonia falconeri* Hook.f.	Falconer's Oberonia	Epiphyte	Ayodhya Hill, Belpahari	Very Common	Sept-Oct
23.	*Pelatantheria insectifera* (Rchb.f.) Ridl.	The insect-bearing Pelatantheria	Epiphyte	Ayodhya Hill	Rare	Sept-Dec
24.	*Peristylus constrictus* (Lindl.) Lindl.	Constricted Peristylus	Terrestrial	Ayodhya Hill	Rare	July-Aug
25.	*Rhynchostylis retusa* (L.) Blume	Rasna (Sanskrit), Fow tail orchid	Epiphyte	Ayodhya Hill, Matha Forest	Common	April-may
26.	*Tropidia curculigoides* Lindl.	Assam Boat-Lip Orchid	Terrestrial	Belpahari, Ayodhya Hill, Joypur Forest	Common	June-Nov
27.	*Vanda tessellata* (Roxb.) Hook. ex G. Don	Nai (Bengali), Rasna	Epiphyte	Ayodhya Hill, Belpahari, Andal, Jhilimili	Very Common	Mar-June
28.	*Vanda testacea* (Lindl.) Rchb.f.	Banda	Epiphyte	Torang	Common	Mar-May
29.	*Zeuxine strateumatica* (L.) Schltr.	Shwethuli (Bengali)	Terrestrial	Bandwan	Common	Feb-Mar

Table 2: Documentation on Medicinal uses of Orchids.

Sr. No.	Name of the Species	Parts Used	Medicinal Uses
1.	*Acampe praemorsa*	Roots	Rheumatism, asthma, sciatica, neuralgias, eye diseases, bronchitis, tonic, curing syphilis and uterine diseases, arthritis, scorpion, snake bites, and hyperacidity (Tsering *et al*., 2017; Chowdhery, 1998; Nongdam, 2014; Yonzone *et al*., 2012).
		Leaves	Paste of leaves taken orally for cure arthritis (Gupta *et al*., 2024).
2.	*Aerides multiflora*	Roots	The paste is used for curing rheumatism, and arthritis, and it also used against cut & wounds (Panda *et al*., 2024).
		Leaves	Leaf Paste is applied for treat cuts, wounds & earaches. Also used for tonic preparation (Tsering *et al*., 2017).
		Stem/pseudobulb	Used for treating cuts & wounds (Pant, 2013; Vaidya *et al*., 2000).
3.	*Aerides odorata*	Roots	The paste is used against joint pain & swelling (Hossain, 2011).
		Leaves	The juice is used for treating tuberculosis (Panda *et al*., 2024; Dash *et al*., 2008).
		Seeds	Used for wound healing (Tsering *et al*., 2017).
4.	*Cymbidium aloifolium*	Root	Powder used in against paralysis (Panda *et al*., 2024). Paste also used for cure tumor and nervous dis-order (Ninawe & Swapna, 2017).
		Rhizome	Purgative, is used in bone fractures. Powdered rhizomes consume as tonic (Tsering *et al*., 2017).
		Leaves	Leaves used for boils and fever (Tsering *et al*., 2017).
		Seeds	Powder is used in healing wounds (Tsering *et al*., 2017).
		Whole plant	Used in weakness of burns, eye, and sores (Tsering *et al*., 2017).
5.	*Dendrobium aphyllum*	Leaves	Fresh juice is used for treat skin infections (Wang, 2021).
		Stems	Fresh stems are externally used to treat burns and scalds (Wang, 2021).
		Whole Plants	Whole plant is used to treat burns and scalds (Wang, 2021).
6.	*Dendrobium macrostachyum*	Aerial parts	The aerial part is used for skin allergies (Wang, 2021).
		Tender Shoot tip	Tender tip juice is used as an ear drop for earache (Hossain, 2011).
		Stem	Stem extract has a high potential for anti-inflammatory activities (Sukumaran and Yadav, 2016).
7.	*Didymoplexis pallens*	NA	NA
8.	*Eulophia diffusiflora*	Tuber	Paste used Against joint-pain (Chandra *et al*., 2024).
		Flower	Mix powder of flower-tuber boiled in water and used against menstruation problem (Chandra *et al*., 2024).
9.	*Eulophia explanata*	Pseudobulb	The pseudobulbs are used in cases of malnutrition and increasing sperm production (Mondal *et al*., 2015).
10.	*Eulophia graminea*	Tuber/ Bulb	Extract used as eardrop for ear problems (Karuppusamy, 2007).
11.	*Eulophia nuda*	Tubers	Dried tubers take against aphrodisiacs (Panda *et al*., 2024)
		Leaves	Leaf-decoction is used in vermifuge (Panda *et al*., 2024).
		Roots	Root juice used in snakebites treatment (Patil and Mahajan, 2013).
12.	*Eulophia ochreata*	Tubers	Used for treating sexual impotence and male sterility, tuber paste is used in Asthma and acute bronchitis, and powder is used to increase stamina for physical activities (Narkhede *et al*., 2016).
		Roots	Used in the treatment of Asthma, and acute bronchitis, as an antidote in snake bites (Patil and Mahajan, 2013).
13.	*Eulophia picta*	Roots	Root paste is used in irregular menstrual cycles in women (Panda *et al*., 2024).
14.	*Habenaria commelinifolia*	Roots	Dried roots are used in curing spermatorrhoea (Parasher, 2021). Also used for urinary troubles (Panda *et al*., 2024).
15.	*Habenaria digitata*	Whole plant	The crude extract was used as analgesic and anti-inflammatory agent (Parasher, 2021).
16.	*Habenaria marginata*	Tubers	Tuber is used in treating malignant ulcer (Parasher, 2021).
17.	*Habenaria plantaginea*	Roots	Used as an antidiabetic (Parasher, 2021).
		Tubers	The tubers of this plant are used for treating blood disorders, hamorrhage, fever, fainting, and wasting diseases. The tubers are also used for treating aches and chest pain (Hossain, 2011).
18.	*Habenaria reniformis*	Whole Plant	Used for treatment of Syphilis (Oudhia, 2012).
19.	*Luisia tristis*	Leaves	Leaf Juice is used to treat chronic wounds, boils and burns (Baral & Kurmi, 2006; Tsering *et al*., 2017).
20.	*Nervilia concolor*	Whole plant	The plant acts as a thirst better and is used in case of sickness due to

			delivery (Panda *et al*., 2024; Fern, 2025).
		Leaves	A decoction of the leaves, known as 'ubat meroyan' was once considered an obligatory protective medicine after childbirth (Fern, 2025).
		Pseudobulb	The pseudobulbs are used in the treatment of 'disturbances of cardiac function' in Thailand (Tropical plant database).
21.	*Nervilia plicata*	Tuber	Tuber paste is used as an external application for insect bites (Hossain, 2011).
		Stem	The extract has some antidiabetic properties (Kumar & Janardhana, 2011).
22.	*Oberonia falconeri*	Whole plants	Used in bone fractures (Tsering *et al.*, 2017).
23.	*Pelatantheria insectifera*	Leaves	Paste used in treating inflammatory complexity (Hoque *et al*., 2021).
24.	*Peristylus constrictus*	Roots	Fresh root extract is applied to boils (Kumar, 2008).
25.	*Rhynchostylis retusa*	Whole plants	The paste of the whole plant is applied on the body against various skin diseases (Shrestha, 2000; Rahamtulla *et al*., 2020; Baral & Kurmi, 2006).
		Leaves	Leaves of this plant are used to treat rheumatic diseases. It showed significant anti-bacterial activity against *Bacillus subtilis* and *E. coli*. (Hossain, 2011). Pastes of leaf buds are used to cure blood dysentery. The leaf paste is applied externally to cure wounds (Panda *et al.*, 2024).
		Flower	Dried flowers are used as insect repellent and to induce vomiting (Thakur, 2010)
		Roots	Juice of the root is applied to cuts and wounds (Thakur, 2010; Manandhar, 2002).
26.	*Tropidia curculigoides*	Tuber and stem decoction	Used against leishmanicidal, Diarrhoea, malaria, antimycobacterial activity (Hossain, 2011).
		Roots	Decoction of the roots of this plant is used to treat diarrhoea (Hossain, 2011).
		Whole plant	Boiled extracts of whole plants are used to treat malaria (Hossain, 2011).
27.	*Vanda tessellata*	Leaves	The juice of the leaves is used to cure earache and skin diseases (Rahamtulla *et al.*, 2020). Leaves are used for fever (Suresh *et al*., 2000).
		Root	Aerial roots and leaves are ground, and the paste is applied for bone fracture (Rahamtulla *et al.*, 2020). The root is used for the treatment of sexually transmitted diseases. The root paste is also used to cure rheumatism and nervous disorders (Panda *et al*., 2024).
28.	*Vanda testacea*	Leaves	Leaf paste is employed in the case of bone fractures in cattle (Panda *et al*., 2024).
		Root	The root decoction is administered to cure asthma (Panda *et al*., 2024).
		Whole Plant	The plant extract called 'Rasna' is useful in rheumatism, nervous disorders, and scorpion signs. The plant is also used for earache (Hossain, 2011).
		Flower	Antiviral, anticancer, earache, rheumatism (Gupta *et al.*, 2024).
29.	*Zeuxine strateumatica*	Root	Used as Tonic (Gupta *et al*., 2024; Acharya & Rokaya 2010).
		Tuber	Used as Tonic (Gupta *et al*., 2024). The tuber is used to prepare salep (Hossain, 2011).

CONCLUSIONS

Due to its unique geographical position, divers' climatic conditions, and edaphic factors, the rarh region provides a platform for growing different floral and faunal wealth. Present communication recorded 29 orchid species, which are fully used as medicinally important plants in traditional systems, except one (*Didymoplexis pallens*). They are being used more by people, which is causing their number depletion & putting them at risk of disappearing from the wild. Due to anthropogenic activities and over-exploitation of orchids, conservation aspects are essential to preserve their biodiversity and ensure the survival of these interesting plants in the scenario of habitat loss and climate change.

FUTURE SCOPE

Significant gaps remain in our understanding of orchid populations, including their spatial distribution, climatic niches, the impacts of climate change on their survival, the severity of various threats, market dynamics, and species-specific conservation and management strategies in the selected areas. Additional knowledge gaps include limited information on the available stock of orchid species, cultivation and harvesting practices,

end users and intermediaries, and the quantities of raw materials traded within the state.

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Conflict of Interest. None.

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