

Orchid Diversity and Conservation through Agro-Ecotourism in Ri-Bhoi District, Meghalaya

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Abstract

Meghalaya supports rich orchid diversity because of its varied elevation, humid monsoon climate, and forest ecosystems. Ri-Bhoi district, including the College of Agriculture, Kyrdemkulai (COA-K) campus, offers opportunities to document and conserve both epiphytic and terrestrial orchids. This paper brings together published information on orchid diversity and distribution in Meghalaya with observations and conservation activities associated with the COA-K agro-ecotourism site and mini-orchid conservatory units. Selected orchids are described by their identifying features, flowering periods, and reported distributions. Habitat loss, unsustainable collection, and development pressures remain important concerns. The paper highlights the value of in situ and ex situ conservation, community participation, education, and responsible agro-ecotourism in supporting orchid conservation. Species records and distributions are based on the cited sources and should be interpreted in that context.

Keywords: Orchidaceae; Meghalaya; Ri-Bhoi; orchid diversity; in situ conservation; ex situ conservation; agro-ecotourism

Introduction

Meghalaya, known as the “Abode of Clouds,” is a state in north-eastern India with substantial variation in topography, rainfall, vegetation, and elevation. These conditions create a range of habitats that support diverse plant communities, including orchids. Ri-Bhoi district is an important setting for studying local plant diversity because of its forested landscapes and the presence of educational and conservation facilities such as the College of Agriculture, Kyrdemkulai (COA-K).

Orchidaceae is one of the largest families of flowering plants, with many species adapted to different habitats. Orchids may be epiphytic, growing on trees, or terrestrial, growing in soil; some also occur on rocks. Published sources report considerable orchid diversity in Meghalaya, although species totals vary among surveys and publications. This paper outlines the regional context, major threats and conservation approaches, and selected orchid species reported from Meghalaya, with particular attention to the conservation and educational potential of the COA-K agro-ecotourism site.

Demography of Ri-Bhoi District [3]

Basic Feature of Ri Bhoi District			
Description	Census 2011		
Total Population	258840		192790
Male	132531		99319
Female	126309		93471
Population Growth	0.3426		0.5143
Area Sq.Km	2448		2448
Density /Km2	106		79
Proportion to Meghalaya Population	0.0872		0.0831
Sex Ratio (Per 1000) Males	953		941
Average Literacy	75.67		65.73
Male Literacy	76.79		68.81
Female Literacy	74.49		62.43
No. of Blocks	4		NA
No. of Villages	579		NA

Orchids of Meghalaya [6]

- i. *Dendrobium densiflorum*
- ii. *Dendrobium chrysanthum*
- iii. *Paphiopedium insigne*
- iv. *Rhyncostylis retusa*
- v. *Dendrobium mostachum*
- vi. *Cymbidium elegans*
- vii. *Cymbidium ieredodaes*
- viii. *Cymbidium longifolium*
- ix. *Arachnate clarkei*
- x. *Areids multiflorum*
- xi. *Dendrobium fimbrantum*
- xii. *Dendrobium wardianum*
- xiii. *Eira coronaria*
- xiv. *Phaius flavus*
- xv. *Vanda coerultea*

Regional Survey and Documentation

Garo Hills, Meghalaya revealed that in Orchidaceae family, there are 16 species belonging to 12 genera. The plant specimens were collected during the survey to prepare herbarium specimens. The collected specimens were identified taxonomically with the help of available floras and literature (Gamble & Fischer 1935, Reddy et al. 2008) and by Department of Botany, NEHU. The specimens were processed for the preparation of Herbarium by standard methods (Santapau 1973. [4]

Threats to Orchid Diversity

The orchids are of ornamental value and have attracted a large number of botanists and horticulturists from very early times. There has been an indiscriminate and ruthless collection of these plants from the wild, in order to meet the big demand from the European markets. Besides, the destruction of their habitats through forest clearings has led to depletion of the natural orchid populations. [7]

Conservation Measures

Recognizing the above-mentioned facts, various initiatives have been taken to conserve the orchid aversity of Meghalaya. These include in situ and ex-situ conservation, research and development, and legal measures. Besides these the sacred groves which are conserved through, traditional faiths are the treasure house of plants. The most effective mechanism for conservation of orchids is in situ conservation. In the Botanical Survey of India, the National Orchidarium was established and research work is done so as to conserve the orchids as a part of ex situ conservation. [7]

Orchid Conservation through Agro-Eco Tourism

The Agro-Ecotourism site located near the Orchard Unit of College of Agriculture, Kyrdemkulai, Meghalaya, serves as an educational, conservation site incorporating both tourism, biodiversity conservation & agricultural aspects. Various plants are grown, and natural vegetation is conserved. Within COA-K campus especially the Agro-Eco Tourism site, Jewel Orchid (*Anoectochilus brevilahris* Lind) has been

spotted and found to be grown naturally in abundance. This shows the suitability of area for Jewel Orchid conservation as these terrestrial orchids are considered rare and found in certain climatic condition and soil. The area is moist, humid with partial sunlight and the orchids are seen to grow near the stream banks. Besides jewel orchid, various orchids are also observed and conserved. Trees harbouring 2-3 species of dendrobium orchids and tree ferns are observed. This also marks the great biodiversity of various epiphytic plants in and around the campus and mainly the eco-tourism site.

Mini-Orchidarium in COA-K

The College of Agriculture, Kyrdemkulai has established two Mini-Orchid Conservatory Units to conserve the orchids found within the campus and in Ri-Bhoi district for both research purpose as well as education, finding its potentiality for commercialising. Around 44 species of orchids have been conserved in the mini orchid conservatory unit. The following table shows the orchid species which have been collected and conserved in the conservatory unit.

Sl no.	Species	Sl no.	Species	Sl no.	Species
1	<i>Dendrobium</i> var. <i>Sonia</i>	16	<i>Eria coronaria</i>	31	<i>Vanda starjessana</i>
2	<i>Dendrobium heterocarpum</i>	17	<i>Emeralda clarkae</i>	32	<i>Hoya</i> spp
3	<i>Dendrobium chrysanthum</i>	18	<i>Aerides multiflora</i>	33	<i>Rhynchosytilis retusa</i>
4	<i>Dendrobium devonianum</i>	19	<i>Aerides odoratum</i>	34	<i>Rhynchosytilis venustum</i>
5	<i>Dendrobium formosum</i>	20	<i>Pleione humilis</i>	36	<i>Cymbidium</i> spp
6	<i>Dendrobium jenkinsii</i>	21	<i>Pleione maculata</i>	37	<i>Coelogyne flaccida</i>
7	<i>Dendrobium transparens</i>	22	<i>Paphiopedilum instigne</i>	38	<i>Coelogyne viscosa</i>
8	<i>Dendrobium parishii</i>	23	<i>Paphiopedilum venustum</i>	39	<i>C. elegans</i>
9	<i>Dendrobium apiphyllum</i>	24	<i>Pholidota articulata</i>	40	<i>C. eburneum</i>
10	<i>Dendrobium moschatum</i>	25	<i>Phalaenopsis</i> spp	41	<i>C. nosterzii</i>
11	<i>Dendrobium fimbriatum</i>	26	<i>Bulbophyllum pictum</i>	42	<i>Ludisia discolor</i>
12	<i>Dendrobium nobile</i>	27	<i>Bulbophyllum caudiflorum</i>	43	<i>Brachycorythis helferi</i>
13	<i>Dendrobium longicorn</i>	28	<i>Bulbophyllum umbellatum</i>	44	<i>Habania acutifera</i>
14	<i>Dendrobium densiflorum</i>	29	<i>Vanda cristata</i>		
15	<i>Eria prunila</i>	30	<i>Vanda coerulesa</i>		

Systematic enumeration

Anoectochilus brevilahris Lind.

Identification: Terrestrial, perennial, deciduous, sympodial herbs with a creeping, above-ground rhizome with wiry roots that look woolly. The leaves are arranged in a rosette and are relatively broad and thin. They are dark green or brownish purple and have a contrasting network of silvery or reddish veins. The flowers are relatively large, hairy, velvety, resupinate and arranged in a short spike. The dorsal sepal and petals overlap to form a hood over the column with the lateral sepals spreading apart from each other. [13]

Flowering: Sep-Nov

Distribution: Ranges from the Himalayas to south China, Southeast Asia, Australia, New

Guinea, Melanesia and Hawaii, Meghalaya (Ri-Bhoi), Manipur, Sikkim, Arunachal Pradesh, Assam. [12, 13, 14]

Aerides odorata Lour. Fl. Cochinch. 525. 1790.

Identification: Epiphyte, stem stout, flowers fragrant, white with purple blotches at extremities, labellum trilobed.

Flowering: May – July.

Distribution: Burnihat, Dawki, Garo hills, Nongpoh [9]

Brachychorythis helfrei Summerh., Kew Bull. 10: 235. 1955.

Identification: Root tuber, oblong. Stems pubescent. Leaves sessile, elliptic-lanceolate, acute. Flowers green; bracts linear-lanceolate, acuminate; dorsal sepal lanceolate, acuminate; lateral sepals ovate-lanceolate, acuminate, recurved; lip purplish, sessile at the base of column, larger than the sepals, orbicular, concave, margin infolded; spur infundibular, acute, shorter than the pedicelled ovary.

Flowering: July-August.

Distribution: Meghalaya (Nongpoh), Assam and Mizoram [8]

Cymbidium devonianum Paxton. in Paxton's Mag. Bot. 10: 97. 1843

Identification: Epiphytic plant of flowers green with purple dots on tree trunks, occasionally lithophytic on moss covered big rocks in dense under canopy layer in the subtropical forests above 1,000m.

Flowering: May-July

Distribution: Nokrek, Tura, Cherrapunjee, Bhutan, China, Mizoram, Manipur, Nagaland, Myanmar, Sikkim, Arunachal Pradesh, Meghalaya [11]

Dendrobium aphyllum (Roxb.) C.E.C.Fisch. in J.S.Gamble, Fl. Madras 1416. 1928

Identification: Epiphytic plant, flowers white to pale purple, lip base with purple lines found to be growing on trunks of *Lagerstromea parviflora*, *Schima wallichii* in the tropical and subtropical forests.

Flowering: April-september

Distribution: Bangladesh, Bhutan, China, Arunachal Pradesh, Assam, Manipur,

Mizoram, Nagaland, Sikkim, Nokrek, Meghalaya [11]

Dendrobium parishii Rchb. f.

Identification: Erect or hanging epiphytic herb; non-rhizomatous; stem cylindrical; flowers pedicellate, bracteate, 3–5 cm long, zygomorphic, lavender colored; bract one per flower with papery texture, transparent.

Flowering and fruiting: May and June.

Distribution: India (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura), Bangladesh, Bhutan, Cambodia, China, Laos, Myanmar, Thailand, and Vietnam. [10]

Dendrobium transparens Wall. ex Lindl. in Gen. Sp. Orchid. Pl. 79. 1830

Identification: Epiphytic plant species having white flowers tinged purplish rose towards the tip, two to three in number, fragrant, recorded on tree trunks in tropical and subtropical forests at 600-1,300m.

Flowering: April-June

Distribution: Nokrek, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim, Myanmar [11]

Esmeralda clarkei Rchb.f, Gard. Chron. n.s., 26: 552. 1886.

Identification: Epiphyte or lithophyte with an elongate pendant stem, Sepals and petals white to yellow with reddish brown transverse stripes, labellum 3-lobed, white with purplish red spots.

Flowering: December – January.

Distribution: Kyllong rock. [9]

Habania acuiifera Wall. ex Lindl., Gen. Sp. Orchid. Pl. 325. 1835.

Identification: Tubers, unequal. Stems stout, few-leaved. Leaves sessile, linear-lanceolate acuminate. Flowers golden yellow; bracts lanceolate, acuminate, as long as or shorter than the beaked pedicelled ovary; dorsal sepal broadly oblong, concave, obtuse; lateral sepals ovate-oblong, concave; petals linear-oblong; lip erect, 3-lobed; sidelobes short, subulate; midlobe much longer than the sidelobes, linear; spur clavate, as long as or shorter than the pedicelled ovary.

Flowering: June-August.

Distribution: Meghalaya (Barapani, Cherrapunji, Jowai, Garampani-Jowai, Jarain, Khleihriat, Mawryngkneng, Waldien

Fide, Nongkhlaw, Nongpoh, Umsaw), Arunachal Pradesh, Manipur, Mizoram and Nagaland [8]

Pholidota articulata Lindl. in Gen. Sp. Orchid. Pl. 38. 1830.

Identification: Epiphytic herbaceous plants with pseudobulbs, leaves usually two, and inflorescence always arise from new pseudobulb at the apex. Flowers white, slightly tinged with red. Grow on tree trunks of *Litsea* species in tropical and sub-tropical forests of nokrek hills at 700-1,400m.

Flowering: May-June

Distribution: Meghalaya, Mizoram, assam, Bhutan, Thailand, China, Vietnam [11]

Paphiopedilum insigne (Wall. ex Lindl.) Pftzer in Jahrb. Wiss. Bot. 19. 159. 1888

Identification: Terrestrial plant with a purplish white flowers growing in tropical and sub-tropical forests along forest margins at 750-1,400m elevation.

Flowering: Nov-Feb

Distribution: Sikkim, Meghalaya, Bhutan, China [11]

Rhyncostylis retusa (L.) Blume, Bijdr. 286. 1825. *Epidendrum retusum* L., Sp. Pl. 953. 1753.

Identification: Epiphyte with stout, repent, short stem, Flowers pinkish white variously marked with purple, labellum entire, purplish.

Flowering: April – May.

Distribution: Bholaganj, Dawki, Raliang, Nongpoh, Jaintia hills, Rongrengiri-Garo hills [9]

Vanda coerulea Griff. ex Lindl., Edwards's Bot. Reg. 33: t. 30. 1847.

Identification: Epiphyte with erect, stout, stem, Flowers blue (shows variation from bluish white to blue), labellum 3-lobed, deep azure blue.

Flowering: September – December.

Distribution: Shillong, Nongpoh – Barapani, Barapani, Jowai, Garo hills [9]

Vanda cristata Wall. ex Lindl., Gen. Sp. Orchid. Pl. 216. 1833.

Identification: Epiphyte with small terete stem, Flowers greenish white-yellow,

labellum 3-lobed, 2 horn like structure present at apex, purplish brown.

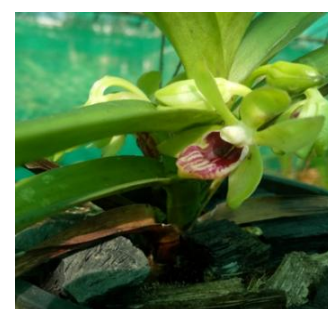
Flowering: April.

Distribution: Jowai, Pongtung, Raliang, Tura [9]

Conclusion

Ri Bhoi district in Meghalaya is a vital hotspot of orchid diversity, supported by its favorable climate and rich forest ecosystems. However, increasing human pressures threaten this biodiversity. Effective conservation through a combination of in situ and ex situ methods, along with community participation and agro-ecotourism, is essential to ensure the long-term survival of these valuable orchid species.

Orchid Gallery:





A: *Anoectochila brevilahris*, B: *Aerides odoratum*, C: *Paphiopedilum insigne*, D: *Vanda coerulea*, E: *Cymbidium devonianum*, F: *Dendrobium aphyllum*, G: *Dendrobium transparens*, H: *Vanda cristata*, I: *Pholidata articulata*, J: *Rhyncostylis retusa*, K: *Brachychorythis helfrei*, L: *Habania acuiifera*

Image source: COA-K, Mini Orchid Conservatory Unit, Ri-Bhoi District, Meghalaya, 793105

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