

GENETIC DIVERSITY RESOURCES, DISTRIBUTION AND PRESENT ECOLOGICAL STATUS OF FIFTEEN NEW RECORDS OF ORCHID SPECIES TO ASSAM OF EASTERN HIMALAYAKhyanjeet Gogoi¹, R. L. Borah², G. C. Sharma³ and Rajendra Yonzone⁴¹ Daisa Bordoloi Nagar, Talap, Tinsukia - 786156, Assam, India² Dept. of Botany, DHSK College, Dibrugarh - 786001, Assam, India³ Dept. of Botany Guwahati University-781014, Assam, India.⁴ Dept. of Botany, St. Joseph's College, North Point, Darjeeling, W. B., India 734104
khyanjeetgogoi@gmail.com**ABSTRACT**

Present paper deals 15 Orchid species with 12 genera viz., *Bryobium pudicum*, *Bulbophyllum apodum*, *Chrysoglossum ornatum*, *Cleisostoma linearilobatum*, *C. simondii*, *Collabium chinense*, *Diploprora championii*, *Eria connate*, *E. ferruginea*, *Taeniophyllum crepidiforme*, *Tainia wrayana*, *Thelasis pygmaea*, *Thrixspermum acuminatissimum*, *T. pygmaeum*, and *Z. glandulosa* were recorded from Dibrugarh district of Assam of Eastern Himalaya for the first time and reported as new distributional records to the state. Out of 15 species 11 species are epiphytic and the rest 4 are terrestrial in habitat. All the species are enumerated with latest citation, brief description, phenology, present ecological status and local distribution within Assam.

Key words: New records, orchid species, distribution, ecological status, Assam.

INTRODUCTION

The Indian state, Assam is the gateway of the North East region of Eastern Himalaya bears a separate identity phytogeographically and represents a number of types of plant communities. Its unique ecosystem favors the luxuriant growth of plants considered nature's reservoir of plants resources-unparalleled compared to any place in the world regards to its richness of floristic composition. Almost all varieties of plants relating to different climatic conditions are found in the state where orchids are a major component of vegetation. Assam orchids show all the types of habits and growth forms as are found in orchidaceous plants. Assam is the second largest state of North-East India and is a rich storehouse of Indian Orchids. The forests of Assam possess a large number of beautiful important Orchids. The total number of Orchid species may be around 193 under 71 genera out of which 27 are endemics (Rao, 1995; Hegde, 2000). In the present investigation, all the above mentioned species are enumerated below in alphabetic order along with latest nomenclature, voucher specimen, habitat ecology, brief description, phenology, date of collection, present ecological status, local distribution within Dibrugarh district of Assam of Eastern Himalaya

and general distribution. Colour photographs for all the species are also provided.

MATERIALS AND METHODS**STUDY AREA**

Dibrugarh District is located in eastern part of upper Assam with an area of 3381 sq. km. The district extends from 27°5' N to 27°42' N latitude and 94°33' E to 95°29' E longitude. It is bounded by Dhemaji district on the north, Sivasagar district on the south and south east, Tinsukia district on the east and Lakhimpur district on the west. The area stretches from the North bank of the mighty Brahmaputra, which flows for a length of 95 km. through the northern part of the district to the Patkai foothills in the south. At the foothills the altitude is 200m MSL and the Burhidihing river bank is 99m MSL.

Joypur Reserve forest forms a part of the world heritage of tropical/sub-tropical wet evergreen forest, classified as 1B/CI, multistoried in structure and rich in biodiversity, more popularly known as 'Rain forest'. The forest is rich in biodiversity and one of the great reservoir of orchid germplasm due to its high rainfall, relative humidity etc. Jokai, Namdang, Telpani and Dihingmukh were mixed forest with evergreen patches, types are 3/152 and 4D/SSI [2].

All these forests are close to the bank of river Buridihing or touching it. The present report is the outcome of several field trips encompassing all the season have been carried out throughout Dibrugarh district of Assam of Eastern Himalaya during 2009-2011. The specimens collected in the flowering and fruiting stages and were processed into dried and mounted herbarium specimens following Jain and Rao, 1977. Identification were done using standard orchid manuals Chowdhery, 1998; Deorani and Naithani, 1995; Deva and Nathani, 1968; Hooker, 1890; Pangtey et al., 1991; Pradhan, 1979; Seidenfaden 1973 and by matching at the Herbarium [Accession Number: 0495, 0492, 0252, 0493, 0221, 0237, 0711, 0480, 0507, 0506, 0481, 0487, 0510, 0714, 0508, 0511] of the BSI Shillong (Assam herbarium), Department of Botany, Guwahati University. Finally all the Herbarium specimens are deposited in the Herbarium, Department of Botany, Guwahati University. For the assessment of present ecological status, plot of 10m x10m quadrates was laid down diagonally in the habitat rich field for epiphytic and 5m x5m quadrates for terrestrial Orchid species.

RESULTS AND DISCUSSION

ENUMERATION

During the periodic field explorations in Dibrugarh district of Assam of Eastern Himalaya, 113 Orchid species with 46 genera have been identified with extended distribution. Out of them, 15 species have been identified as *Bryobium pudicum*, *Bulbophyllum apodum*, *Chrysoglossum ornatum*, *Cleisostoma linearilobatum*, *C. simondii*, *Collabium chinense*, *Diploprora championii*, *Eria connata*, *E. ferruginea*, *Taeniophyllum crepidiforme*, *Tainia wrayana*, *Thelasis pygmaea*, *Thrixspermum acuminatissimum*, *T. pygmaeum*, and *Z. glandulosa* which are not recorded earlier from Assam of Eastern Himalaya and hence they have been reported here as new records to the state. Of them, *Cleisostoma*, *Eria*, *Thrixspermum* and *Zeuxine* possess 2 species each and the others have only one species out of 16 species, 11 are epiphytic and the rest 5 are terrestrial in habitat.

Bryobium pudicum (Ridl.) Y.P. Ng & P.J. Cribb, *Orchid Rev.* 113: 272. 2005.

Eria pudica Ridl. in *Jour. Linn. Soc.* 32: 294. 1896. [Accession Number: Gogoi et al., 0495.]

Epiphytic, pseudobulbs crowded, ovate, 2.5-3.5 x 1-2 cm fusiform, 3-4 cm x 5-7 mm, enclosed in 4 or 5 membranous sheaths, 2- or 3-noded; leaves solitary, elliptic, oblong, 12-15 x 3-3.5 cm, acute, petiolate; inflorescence lateral, arising from the base of the pseudobulb, 3-4 cm, densely many flowered, grayish white pubescent; flowers spreading, pinkish white, pubescent, buff with darker strips.

Habitat: Epiphyte in deciduous forest and evergreen forest; **Flowering:** April – August; **Local distribution within Dibrugarh district:** Jeypore R. F.; **General distribution:** Peninsular Malaysia, Borneo; **Present ecological status:** Rare.

Bulbophyllum apodum Hook. F., *Fl. Brit. India* 5: 766. 1890.

Bulbophyllum ebulbum King & Pantl., *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 64(2): 334. 1895.

[Accession Number: Gogoi et al., 0492.]

Epiphyte, rhizomes stout, smooth, pseudobulb absent; leaf 15-18 x 2.5-3 cm, solitary arising from rhizome at distance of 7.5 cm, oblong-lanceolate, acute, ending in a channeled petiole, 4-4.5 cm long; inflorescence many flowered racemes, arising from the base of leaves, shorter, many flowered; flowers pale-green, about 0.8 cm long; sepals equal, lanceolate, acuminate; petals linear-lanceolate; lip oblong stipitate; column with small quadrate wings, arms minute.

Habitat: Epiphyte on tree trunks in dense humid evergreen forest; **Flowering:** May – June; **Local distribution within Dibrugarh district:** Jeypore R. F.; **General distribution:** N.E. India, China, Thailand, Vietnam, Malaysia, Vietnam, Java, Sumatra, Borneo, Philippines; **Present ecological status:** Rare.

Chrysoglossum ornatum Bl., *Bijdr.* 338. 1825.

Chrysoglossum erraticum Hook. F. *Fl. Brit. India*, 5: 784, 1890. [Accession Number: Borah et al., 0252.]

Terrestrial, pseudobulbs, cylindrical, 5-7 x 0.8-2 cm, 1-leaved; leaf blade narrowly elliptic, strongly plicate, 20-34 x 4.5-7.5 cm, papery, 5-veined, base cuneate, apex shortly acuminate; petiole 10 cm; peduncle to 50 cm, glabrous, with 4 or 5 sheaths; rachis laxly 10-12 flowered; flowers green with reddish brown spots, lip white or yellowish spotted with purple, column white.

Habitat: Shaded and humid places in forests; **Flowering:** August – October; **Local distribution within Dibrugarh district:** Jeypore R. F.; **General**

distribution: N. E. India, China, Taiwan, Bhutan, Cambodia, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; *Present ecological status*: Rare.

Cleisostoma linearilobatum (Seidenf. & Smitinand) Garay, Bot. Mus. Leaf. 23: 172. 1972; Hook. f., Fl. Brit. India, 6: 75. 1890. [Accession Number: Gogoi *et al.*, 0493.]

Epiphytic; stem short; leaves oblong 8-10 x 2-2.8 cm, obliquely truncate at apex; inflorescence pendulous often branched, 20-25 cm long, peduncles purplish; raceme many flowered; flowers yellow turning to brown with pinkish-white lip, small. **Habitat**: Epiphytic on tree trunks in evergreen forests; *Flowering*: May – July; *Local distribution within Dibrugarh district*: Jeyapore; *General distribution*: N.E. India, Bhutan; *Present ecological status*: Rare. [Fig: 1]

Cleisostoma simondii (Gagnep.) Scidenf. In Dansk Bot. Arkiv 29(3): 66. 1975.

Sarcanthus teretifolius (Lindl.) Lindl., Gen. Sp. Orchid. 324. 1833.

Cleisostoma seidenfadenii Garay in Bot. Mus. Leaf. Harvard Univ. 23(4): 175. 1972. [Accession Number: Gogoi *et al.*, 0221.]

Epiphytic; stem upto 25-50 cm long, terete, usually branched, many leaved, internodes 1-2.5 cm; leaf fleshy, terete, slender, obtuse; inflorescence lateral, ascending, longer than leaves, un-branched or sometimes shortly branched, 8-12 flowered; flowers yellowish green.

Habitat: Epiphyte on thick-barked tree trunks in evergreen and deciduous forest; *Flowering*: August-October; *Local distribution within Dibrugarh district*: Jeyapore R. F.; *General distribution*: India (N.E.), China, Thailand, Vietnam; *Present ecological status*: Rare. [Fig: 2]

Collabium chinense (Rolfe) T. Tang & F.T. Wang, in Fl. Hainan. 4: 217. 1977.

Chrysoglossum robinsonii Ridley in Jour. Fed. Mal. St. Mus. 5: 157. 1915. [Accession Number: Gogoi *et al.*, 0237.]

Terrestrial, rhizome terete; pseudobulbs cylindrical, petiolate base slightly dilated; leaf blade 7-15 x 4-7 cm, papery, base subrounded, acute; petiole 1-2 cm; inflorescence 14-18 cm, glabrous, with 2-4 membranous tubular sheaths, laxly 4-7 flowered; flowers medium-sized, sepals and petals green, lip white, column yellow.

Habitat: Shaded and humid places in dense forests; *Flowering*: June – July; *Local distribution within Dibrugarh district*: Jeyapore R. F.; *General distribution*: N. E. India, China, Thailand, Vietnam; *Present ecological status*: Rare. [Fig: 3]

Diploprora championii (Lindl. ex Benth.) Hook. F. Fl. Brit. India. 6(1): 26. 1890 (as *championii*); Hook. F., Icon. Pl. 22: t. 2120. 1892; King & Pantl. in Ann. R. Bot. Gard. Calc. 8: t. 2120. 1898; Saldanha & Nicolson, Fl. Hassan 824. 1976; Liu & Su, Fl. Taiwan 5: 975. 1978.

Cottonia championii Lindl. ex Benth. in Hooker's J. Bot. Kew Gard. Misc. 7: 35. 1855. [Accession Number: Gogoi *et al.*, 0711.]

Pendulous epiphytes, roots long, vermiform; stems leafy, 5-35 cm long; internodes 0.5-2 cm long, surrounded by persistent leaf sheaths. Leaves sessile, twisted, falcate or linear-oblong, 8-12 x 2cm, apex acute or sometimes unequally 2-lobed; inflorescence 5-8 cm long, zigzag, leaf-opposed; flowers 3-5, pale yellow, 1.5 cm in diam.

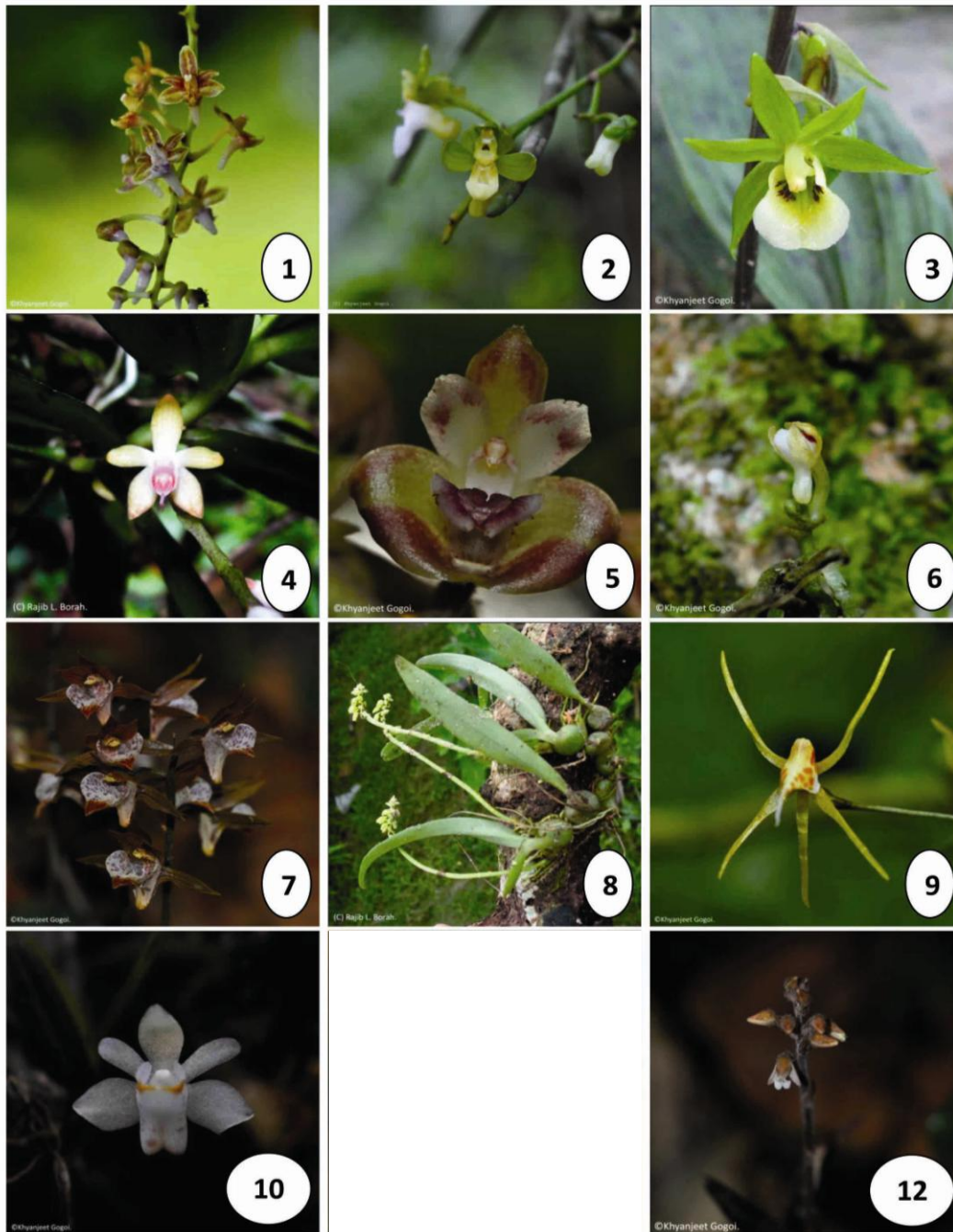
Habitat: Growing epiphytic on branches of small trees in forests; *Flowering*: March – June; *Local distribution within Dibrugarh district*: Jokai R. F.; *General distribution*: India, China, Myanmar, Sri Lanka, Thailand, Taiwan, Vietnam; *Present ecological status*: Rare. [Fig: 4]

Eria connata Joseph, Hegde & Abbareddy, in Bull. Bot. Surv. India 24; 114, f. 1-7. 1982; Chowdhery, Orch. Fl. Arunachal Prad., 361, 1998; Mishra, Orch. India, 297, 2007. [Accession Number: Gogoi *et al.*, 0480.]

Epiphytic, up to 25 cm long including leaves; roots wiry; pseudobulbs sub-cylindrical, 5-15x 0.8-1 cm, obliquely noded, leafless when old, shoots arising from the base of old pseudobulbs, sheathed at base; leaves 4, narrowly elliptic, 6-8x1-1.8 cm; sub-falcate at apex; inflorescence 1-2, in axillary or leaf opposed, racemose, globose heads; flowers creamy white, with yellow lip.

Habitat: Epiphyte in dense humid evergreen forest; *Flowering*: July – September; *Local distribution within Dibrugarh district*: Jeyapore R. F.; *General distribution*: N.E. India and Bhutan; *Present ecological status*: Rare.

Eria ferruginea Lindl., Edwards's Bot. Reg. 25: t. 35. 1839; Hook. F., Fl. Brit. India. 5: 804. 1890; Chowdhery, Orch. Fl. Arunachal Prad., 363, 1998;



Plate, 1: Fig, 1: *Cleisostoma linearilobatum*; Fig, 2: *Cleisostoma simondii*, Fig, 3: *Collabium chinense*; Fig, 4: *Diploprora championii*; Fig, 5: *Eria ferruginea*; Fig, 6: *Taeniophyllum crepidiforme*; Fig, 7: *Tainia wrayana*; Fig, 8: *Thelasis pygmaea*; Fig, 9: *Thrixspermum acuminatissimum*, Fig, 10: *Thrixspermum pygmaeum*; Fig, 12: *Zeuxine glandulosa*

Mishra, Orch. India, 297, 2007. [Accession Number: Gogoi et al., 0507.]

Epiphytic; stems up to 40 cm long, including leaves; leaves 2-5, lanceolate, 12-22 x 3-4 cm, acuminate, thickly coriaceous, scapes 10-16 cm long, arising from base of stem, sheathed at base; inflorescence

racemose, 8-13 cm long, flowers pink; sepals ovate-lanceolate, 9-nerved; petals obovate-oblong; lip 3-lobed, saccate at base; hypochile shortly clawed; epichile short, crisped; disc with large toothed crests; column short, stout.

Habitat: Epiphyte in dense humid evergreen forest; **Flowering:** June – July; **Local distribution within Dibrugarh district:** Jeypore R. F.; **General Taeniophyllum crepidiforme** (King & Pantl.) King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 245, t. 325. 1898; Chowdhery, Orch. Fl. Arunachal Prad., 656, 1998; Mishra, Orch. India, 317, 2007. **distribution:** N.E. India and Bhutan; **Present ecological status:** Rare. [Fig: 5]

Sarcochilus crepidiformis King & Pantl. in Jour. Asiat. Soc. Bengal 64: 340. 1895. [Accession Number: Gogoi *et al.*, 0506.]

Small, stemless, leafless, epiphytic herbs devoid of pseudobulbs with comparatively thick, flat greenish roots; inflorescence short, filiform; flowers minute, greenish white with purple tinge; sepals ovate, almost equal, incurved with blunt apex; petals lanceolate, shorter than the sepals; lip sessile forming a round cup with entire edges; spur dilated, horizontal, pilose inside its mouth.

Habitat: Epiphyte in humid evergreen forest; **Flowering:** August- September; **Local distribution within Dibrugarh district:** Jeypore R. F.; **General distribution:** Eastern Himalayas, Sikkim and Assam; **Present ecological status:** Rare. [Fig: 6]

Tainia wrayana (Hook. F.) J.J. Sm., Bull. Jard. Bot. Buitenzorg, II, 8: 6. 1912; Pradhan, Indian Orchid-II, 242, 1979; Chowdhery, Orch. Fl. Arunachal Prad., 661, 1998.

Ipsea wrayana Hook. F., Fl. Brit. India, 5: 821. 1890.

Mischobulbum wrayanum (Hook. F.) Rolfe, Sathish Kumar & Manilal in Kew Bull. 42:942. 1987. Mishra, Orch. India, 307, 2007. [Accession Number: Gogoi *et al.*, 0481.]

Terrestrial, 10-15 cm long including leaves; pseudobulbs narrowly fusiform, 8-10 cm long, one leaved, with membranous sheaths; leaves ovate-elliptic, 10-15 x 7-9 cm, cordate at base, 7-9 nerved, petioles stout, terete; inflorescence 3-10 flowered, pubescent, longer than leaves; flowers greenish flushed with red, 3 cm across.

Habitat: Terrestrial in dense humid evergreen forest; **Flowering:** June – July; **Local distribution within Dibrugarh district:** Jeypore R. F.; **General distribution:** N.E. India, Thailand, Malaysia to Sumatra; **Present ecological status:** Rare. [Fig: 7]

Thelasis pygmaea (Griff.) Lindl. in Jour. Proc. Linn. Soc. 3: 63. 1859; Hook. F. Fl. Brit. India, 6: 86, 1890; Chowdhery, Orch. Fl. Arunachal Prad., 662, 1998.

Euproboscis pygmaea Griff. in Calcutta Jour. Nath. Hist. 5: 372, t. 26. 1844. [Accession Number: Gogoi *et al.*, 0487.]

Epiphyte, pseudobulbs tufted, flattened globose, 3-10 x 7-18 mm, apex often with 1 large leaf and 1 or 2 smaller leaves; larger leaf blade narrowly oblong-ob lanceolate to nearly narrowly oblong, 4-8 x 0.6-1.3 cm, slightly fleshy, base contracted into a short petiole, apex obtuse, acute, or unequally bilobed; small leaf blade suboblong, 0.7-1.5 cm; inflorescence 10-20 cm, slender, with 2 or 3 basal sheaths; flowers yellowish green, not opening widely.

Habitat: Epiphytic in mixed deciduous and evergreen forest; **Flowering:** July – September; **Local distribution within Dibrugarh district:** Jeypore R. F.; **General distribution:** India, Nepal, Burma, China, Thailand, Vietnam, Peninsular Malaysia, Singapore, Sumatra, Java, Borneo, New Guinea, Philippines; **Present ecological status:** Rare. [Fig: 8]

Thrixspermum acuminatissimum (Bl.) Rchb. f., Xenia Orchid. 2: 121. 1868; Scidenfaden *et al.*, Orchid of Thailand, iv-I, 518, 1962.

Sarcochilus notabilis Hook. f. Fl. Brit. India, 6: 42, 1890.

Thrixspermum notabile (Hook. f.) Kuntze, Revis. Gen. Pl., 2: 682, 1891. [Accession Number: Gogoi *et al.*, 0510.]

Epiphytic; stem very short, 1-2 cm long; leaves distichous, 3.5-5 x 1-1.5 cm, sub-sessile, bilobed at apex, articulated to sheathing leaf base, coriaceous, oblong; inflorescence 3 or more, arising from one point on the stem, 10-12 cm long; flowers yellow; sepals and petals yellow, filiform, membranous, 2-2.5 cm long, narrowly lanceolate, linear-oblong, acuminate, 3 nerved at the base; lip with a large sac rounded at the base, white with yellow and reddish-brown spots, apex white, delicately veined, contracted into a capillary tail.

Habitat: Growing on lateral branches of lower canopy of host tree, cool and shady place;

Flowering: July – December; **Local distribution within Dibrugarh district:** Jeypore R. F.; **General distribution:** India (Assam), Thailand, Cambodia, S. Vietnam, Malacca, Java, Sumatra, Philippines; **Present ecological status:** Rare. [Fig: 9]

Thrixspermum pygmaeum (King & Pantl.) Holtt., Kew Bull. 14: 275 (1960); Chowdhery, Orch. Fl.

Arunachal Prad., 666, 1998; Mishra, Orch. India, 318, 2007.

Sarcochilus pygmaeus King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 207, t. 277. 1898. [Accession Number: Gogoi et al., 0714.]

Epiphytic; stems small, pendulous, 1-2 cm long; leaves 2-3, linear-oblong, 4-6 x 1-1.5 cm, acuminate, coriaceous; inflorescence 2-4 flowered, smaller than or as long as the leaves; peduncles minutely bracteolate; flowers about 1 cm across, white. *Habitat*: Epiphyte in mixed deciduous forest, in humid evergreen forest; *Flowering*: May – August; *Local distribution within Dibrugarh district*: Jeypore R. F.; *General distribution*: N.E. India, Burma, China, Thailand, Cambodia, Vietnam, Peninsular Malaysia, Sumatra, Java, Borneo, Philippines; *Present ecological status*: Common. [Fig: 10]

Zeuxine glandulosa King & Pantling in Ann. Roy. Bot. Gard. (Calcutta) 8: 288, t. 384. 1898.

Heterozeuxine glandulosa (King and Pantling) Hashimoto, Proc. 14th World Orchid Conf.: 125. 1993. [Accession Number: Gogoi et al., 0511.]

Terrestrial, plant 5-20 cm long; leaves oblong-lanceolate, acute, shortly petiolate, 2.5-5 x 0.6-1 cm broad, blackish-purple; petiole expanded into a wide hyaline sheath; inflorescence laxly few flowered; flowers 0.5 cm long olivaceous green, column and central contracted part of lip white.

Habitat: Growing in dense forest, cool and shady place; *Flowering*: March – April; *Local distribution within Dibrugarh district*: Jeypore R. F.; *General*

General Distribution: Lower Bhutan and the Trail of Sikkim Himalaya, North Bengal and Assam; *Present ecological status*: Rare. [Fig: 12].

Present status of *Thrixspermum pygmaeum* is common and the other 15 species are rare in the regions. Higher number of species falls in rare status indicates that the threat is still persisting in the natural habitat in the regions. It is also observed that whole Orchidaceae family facing high risk of threat in habitat in comparison with other plant species in the study areas. Rapid destruction of natural habitat by many means like deforestation, extension of agricultural lands, urbanization, developmental schemes, atmospheric pollution, pesticidal and weedicidal pollution and many more anthropogenic activities in the study areas are the main reasons. Therefore, protection and conservation of natural habitat is the only prominent way to save our precious natural wealth like Orchid species of the regions. *Thrixspermum acuminatissimum* is new recollection for India after 120 years. Hooker (1890) described this species as *Sarcochilus notabilis* but there is no recent report about this species collected and documented from India.

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