

Distribution of *Dendrobium* Swartz (Orchidaceae) in Tropical Evergreen Forests of Upper Assam, India

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Abstract

This paper deals with the distribution of different species of *Dendrobium* Swartz (Orchidaceae) in the Tropical evergreen forests of Assam in Northeast India. A total of 15 species of *Dendrobium* were recorded. Out of these, two species are newly reported from Upper Assam. All the species are enumerated with brief description and distribution.

Key words: Distribution, *Dendrobium*, Orchidaceae, Tropical evergreen forest, Assam.

INTRODUCTION

Assam is one of the biodiversity rich regions of Eastern India due to its unique and varied climatic condition and phytogeography. It harbours a large number of plant communities which enhances the importance and floristic composition in comparison to the other region of India. Among the various taxa the Orchidaceae is one of the enchanting and interesting group of plants. The community is characterised by all form of habitat ranging from epiphytic to terrestrial and saprophytic. The tropical evergreen forest in upper Assam is distributed in the southern bank of the river Brahmaputra, spread over Sibsagar, Dibrugarh and Tinsukia districts (27°6' – 27° 4' N latitude and 96° – 94° 4' E longitude). These districts are bordering with the states of Nagaland and Arunachal Pradesh and their forests are in contiguous with these states. Henceforth, the vegetation in the area is maintaining high floristic diversity though the habitat is highly disturbed and represent badly fragmented ecosystem.

The orchid diversity in Assam (including other states of Northeast India) is well known (Bhagabati *et al* 2006; Rao 2007) and a number of publications on these plants from different parts of Assam is made by different authors including Das *et al* (2008), Gogoi *et al* (2009, 2010), and Gogoi 2012. Additions to the orchid flora of Assam is also a continuous process by different authors like Gogoi *et al* (2012a,b) and Das *et al* (2010).

In this paper documentation of the species of *Dendrobium* Swartz has been made since most of the species of this genus possess large and showy flowers which might be of commercial importance. And, a number of its species are usually grown in the households of Assam.

The genus *Dendrobium* Swartz comprises of about 900 species worldwide (Kumar & Manilal (1994) in tropical and subtropical regions and are widely distributed in India, China, southeast Asia, Japan, Malaysia, Philippines, New Guinea, Australia, the Pacific Islands and New Zealand. The genus is represented by about 91 species in India out of which 24 species occurs in Assam (Bhagabati *et al* 2006). Rao 2007 while working on the orchid flora of Northeast India has reported only 21 species of *Dendrobium* from Assam, while Chowdhery 2009 has reported 26 species from this state. However, the exact number of *Dendrobium* species in Assam cannot be ascertained from these three publications as together the figure may rise to near 50. In the tropical evergreen forests of Assam *Dendrobium* is one of the dominant genera among the orchids. In our present investigation in the tropical evergreen forests we have encountered 11 species of the *Dendrobium*. And 4 species viz, *Dendrobium cathcartii*, *D. cumulatum*, *D. stuposum* and *D. sulcatum*. are from the collection of Gogoi *et al* (2009) from the same region and are the additions to our present investigation. All the species are taxonomically enumerated along with their distribution and flowering period.

MATERIAL AND METHODS

Different species of *Dendrobium* Swartz have been collected during our several field trips carried out in the region in periodic intervals of time throughout the year. Live samples were collected and maintained in the Orchidarium of the Department of Botany, Sibsagar College for further taxonomic studies. The samples were critically diagnosed with the aid of standard manuals and other publications viz., Barua (2001), Chowdhery (1998), King & Pantling (1898), Hooker (1890), Kumar & Manilal (1994) and Pradhan (1979). Herbarium specimens were matched and finally deposited in the Herbarium of Botany Department, Gauhati University.

ENUMERATION OF RECORDED SPECIES

Key to the Species

- 1a. Plants with fusiform to clavate stems or pseudobulbs, often angled, sometimes compressed, leaves 1 – 5, thick, nearly sheathless, clustered at apex 2
- 1b. Plants otherwise, leaves with distinct sheaths, often covering most of the internodes - - 3
- 2a. Stems laterally compressed, petals entire; lip boat shaped, concave; papillae mostly along margin *D. sulcatum*
- 2b. Stems not laterally compressed, petals minutely dentate; lip orbicular, flat, crenulated – ciliate along margin *D. chrysotoxum*
- 3a. Stems with at least some of the internodes either fleshy or swollen 4
- 3b. Stems compressed or wiry, without fleshy or swollen internodes. 11
- 4a. Flowers usually with a large, narrow mentum *D. cumulatum*
- 4b. Flowers usually with a short, saccate mentum 5
- 5a. Flowers 1.2 – 4.5 cm across, disc with varying ornaments 6
- 5b. Flowers more than 3.5cm across, lips without side lobes, disc without ornaments except for a callus at base 8
- 6a. Lip without side lobes 7
- 6b. Lip with 3 lobes, side lobes present, with dull yellow patches *D. stuposum*

- 7a. Disc with a pubescent transversal wall separating hypochile and epichile . . . *D. aduncum*
 7b. Disc pilose, with a central fleshy sulcate line *D. transparens*
 8a. Lip edges strongly branched- fimbriate *D. fimbriatum*
 8b. Lip edges not branched- fimbriate, erose dentate or ciliate at margin . . . *D. moschatum*
 9a. Basal callus on lip splitting up in 3 keels entering one third into the disc . . *D. aphyllum*
 9b. Basal callus on lip if any, fading into the disc without splitting up in keels 10
 10a. Petals twice as broad as dorsal sepals or more *D. nobile*
 10b. Petals not twice as broad as dorsal sepals *D. lituiflorum*
 11a. Leaves laterally compressed 12
 11b. Leaves dorsiventral or terete 13
 12a. Stems with apical floriferous part with rudimentary leaves, leaves lanceolate, flowers yellowish *D. acinaciforme*
 12b. Stems with apical floriferous part without rudimentary leaves, leaves elliptic oblong, flowers white *D. terminale*
 13a. Leaves dorsiventral, lip elliptic oblong without any apical notch *D. cathcartii*
 13b. Leaves terete, reflexed, lip obovate, notched at apex *D. kentrophyllum*

Dendrobium acinaciforme Roxburgh, Fl. Ind. 3: 487. 1832; Hooker *f.*, Fl. Brit. India 5: 723. 1890., Chowdhery, Orch. Fl. of Arunachal Prad. 283. 1998, Baruah, Orch Fl Kamrup Dist; 151, 2001

Aporum acinaciforme (Roxburgh) Griffith; *Aporum acinaciforme* (Roxburgh) Brieger; *Aporum scalpelliforme* (Teijsmann & Binnendijk) Rauschert; *Callista acinaciformis* (Roxburgh) Kuntze; *Dendrobium scalpelliforme* Teijsmann & Binnendijk

Epiphytic, plant 30 to 100 cm tall, stem stuffed, naked. Leaves lanceolate, acute. Inflorescence racemose, lateral on apices of lateral. Flowers ca. 1 cm long, yellowish white

Flowering: June – July

Exsiccatus: Abhoypur, Nath & Das, SCBOT 0086.

Distribution: South central China, Malaysia, Laos, Cambodia, Vietnam, Eastern Himalaya; India: Assam.

Dendrobium aduncum (Wallich ex Lindley) Wallich, in Bot. Reg. 1842, misc. 62, t. 15. 1846; Hooker *f.*, Fl. Brit. India 5: 730. 1890., Chowdhery, Orch. Fl. of Arunachal Prad. 283. 1998.

Callista adunca (Wallich ex Lindley) Kuntze; *Dendrobium aduncum* var. *faulhaberianum* (Schlechter) Tang & F.T. Wang; *Dendrobium faulhaberianum* Schlechter; *Dendrobium oxyanthum* Gagnepien

Epiphytic, stems branching, 30 to 60 cm long; leaves narrowly lanceolate, acute, obliquely bifid, 5 to 7cm in length and 0.08 to 1 cm in breadth; flowers 1 to 2cm long.

Flowering: May – June

Exsiccatus: Deopani, Nath & Das, SCBOT 0170.

Distribution: Bhutan, Myanmar, Thailand, Laos, China, Hong Kong and Vietnam, India: Eastern Himalaya, Sikkim, Assam.

Dendrobium aphyllum (Roxburgh) C.E.C. Fischer in Gamble, Fl. Pres. Madras 1416. 1928; Chowdhery, Orch. Fl. of Arunachal Prad. 287. 1998, Baruah, Orch Fl. Kamrup dist; 169. 2001

Callista macrostachya (Lindley) Kuntze; *Dendrobium gamblei* King & Pantling

Epiphytic, stems elongate, jointed, cylindrical, slender with nodes and internodes; leaves deciduous, sessile; flowers 1 to 3, pinkish white, aromatic.

Flowering: July- August.

Exsiccatu: Sibsagar, Nath & Das, SCBOT 0005.

Distribution: Maldives, Nepal, Sri Lanka, Myanmar, Thailand, Malaysia Laos, Vietnam, Borneo, Java, Lesser Sunda Islands, Sumatra, Sulawesi, Queensland Australia, Bangladesh, India, E. & W. Himalayas, Assam.

Dendrobium cathcartii Hooker f., Fl. Brit. India 5: 720. 1890; King & Pantling in Ann. Roy. Bot. Gard. Calcutta 8: 43, t. 57. 1898; Chowdhery, Orch. Fl. of Arunachal Prad. 290. 1998. *Callista cathcartii* (Hooker f). Kuntz.

Epiphytic herb, erect, stems stout, leaves linear-lanceolate, flowers in pairs, fragrant, greenish, yellow, lip purple, acute, mentum stout, curved.

Flowering: April – June

Exsiccatae: Abhoypur, Nath & Das, SCBOT 0185

Distribution: Laos, India: Eastern Himalaya, Assam.

Dendrobium chrysotoxum Lindley in Bot. Reg. Tt. 19, 36. 1847; Hook.f., Fl Brit India 5:750. 1890., Chowdhery, Orch. Fl. of Arunachal Pradesh, 293. 1998.

Callista chrysotoxa (Lindley) F.G. Brieger; *Callista chrysotoxa* (Lindley) Kuntze; *Callista suavissima* Kuntze.

Epiphytic, stem long, angled, covered with white membranous sheaths; leaves 2 to 3, arising from the apex of the stem, oblong, coriaceous; inflorescence arises from nodes near the apex of the pseudobulb and it is lax and pendulous; flowers orange yellow.

Flowering: April – June

Exsiccatu: Digboi, Nath & Das, SCBOT 0243

Distribution: Myanmar, Laos, Thailand, Vietnam, China, Bangladesh, India: Eastern Himalayas, Assam: Kameng, Tirap, Siang and Subansiri.

Dendrobium cumulatum (Wallich) Lindley in Gard. Chron. 756. 1855; Hooker f., Fl. Brit India 5: 731. 1890; King & Pantling in Ann. Roy. Bot. Grad. Calcutta 8: 46, t. 63. 1898., Chowdhery, Orch. Fl. of Arunachal Pradesh, 295. 1998

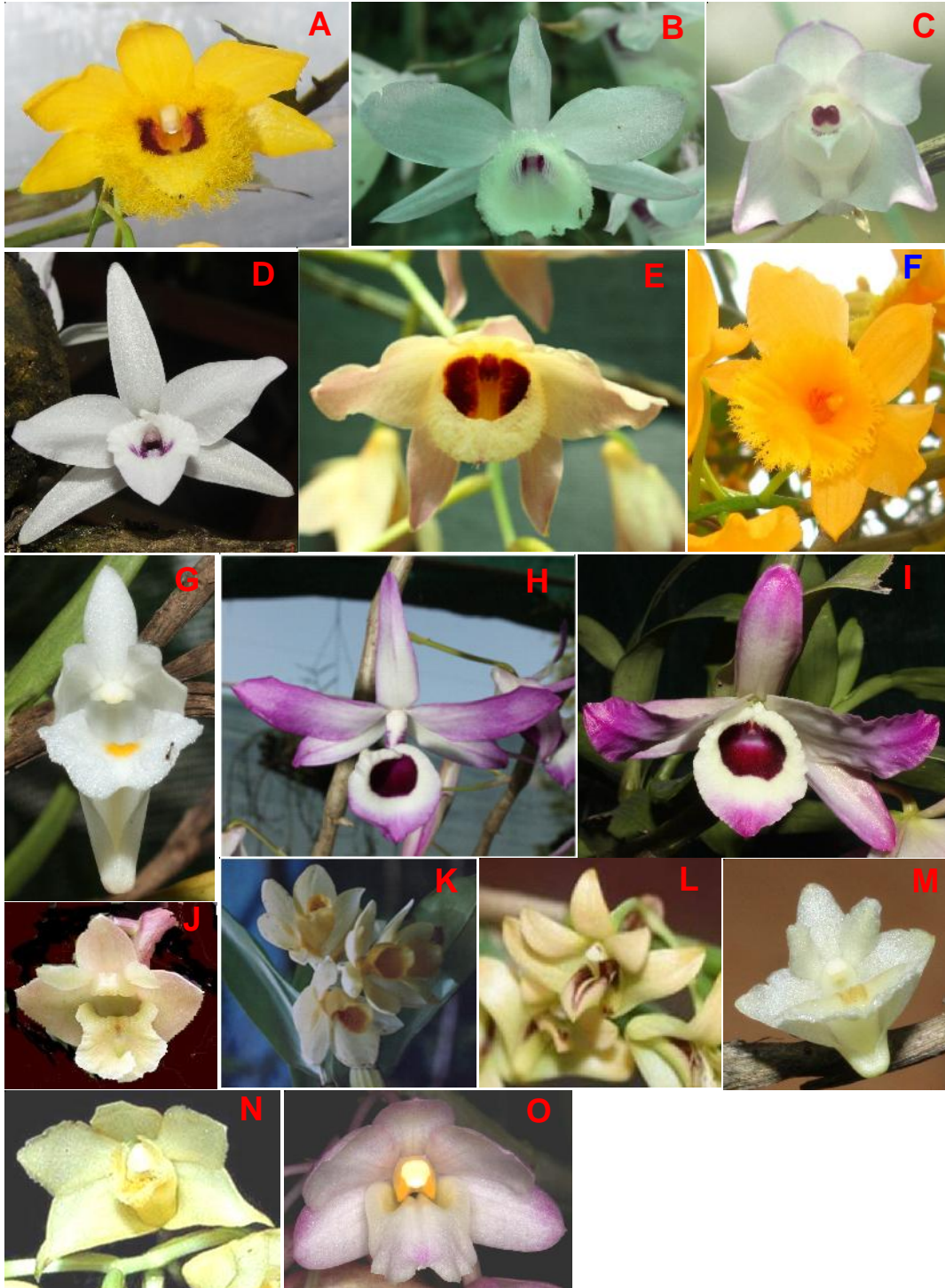
Callista cumulata (Lindley) Kuntze; *Dendrobium eoum* Ridley; *Eurycaulis cumulatus* (Lindley) M.A. Clements; *Pedilonum eoum* (Ridley) Rauschert

Epiphytic, stem 30 to 50 cm long, clavate, leaves oblong lanceolate, inflorescence of corymbiform racemes. Flowers purplish, bracted, lip obovate spatulate, erose, mentum pouched apex.

Flowering: May – August

Exsiccatae: Jeypore, Nath & Das, SCBOT 0116

Distribution: Thailand, Cambodia, Vietnam, Borneo, Myanmar, Bhutan, Nepal, India: Sikkim, Eastern Himalaya, Assam.



PLAE I: Flowers of different species of *Dendrobium* Swartz recorded from Assam. **A.** *D. fimbriatum*; **B.** *D. aphyllum*; **C.** *D. aduncum*; **D.** *D. transperens*; **E.** *D. moschatum*; **F.** *D. chrysotoxum*; **G.** *D. kentrophyllum*; **H.** *D. lituiflorum*; **I.** *D. nobile*; **J.** *D. acinaciforme*; **K.** *D. sulcatum*; **L.** *D. cathcartii*; **M.** *D. terminale*; **N.** *D. stuposum*; **O.** *D. cumulatum*

Dendrobium fimbriatum W. Hooker, Exot. Fl. T. 71. 1823; Hooker *f.*, Fl. Brit. India 5: 745. 1890; King & Pantling in Ann. Roy. Bot. Grand. Calcutta 8:58, t.82. 1898., Chowdhery, Orch. Fl. of Arunachal Pradesh, 301. 1998, I.C. Baruah, Orch Fl Kamrup dist; 163, 2001

Callista fimbriata (Hooker) Kuntze; *Callista normalis* (Falconer) Kuntze; *Dendrobium normale* Falconer; *Dendrobium paxtonii* Paxton

Epiphytic, stems cylindric, tapering towards the apex; leaves lanceolate, coriaceous, 8 to 13 cm in length, 1.0 to 1.5 cm in breath; inflorescences raceme, flowers 2.5 to 3 cm across.

Flowering: April – May

Exsiccatu: Jeypore, Nath & Das, SCBOT 0032

Distribution: China, Bangladesh, Mynamar, Thailand, Malaysia, Laos, Vietnam, Nepal, Bhutan, India: Sikkim, Western Himalayas, Eastern Himalayas and Assam

Dendrobium kentrophyllum Hooker *f.*, Fl. Brit. India 5: 725. 1890., Chowdhery, Orch. Fl. of Arunachal Pradesh, 305. 1998.

Synonyms: *Aporum abicolor* (Ridley) Rauschert, *Aporum kentrophyllum* (Hooker *f.*) Brieger, *Aporum capitellatum* (J.J. Smith) Rauschert

Epiphytic, Caespitose, upto 35 cm long, stems fleshy, curved, flowers greenish yellow, solitary, terminal, lip cuneate, notched at apex, mentum large.

Flowering: July – August

Exsiccatu: Abhoypur, Nath & Das, SCBOT 0087

Distribution: Thailand, Malaysia, Borneo, Sumatra, India: Eastern Himalaya and Assam.

Dendrobium lituiflorum Lindley in Gard. Chron. 372. 1856; Hooker *f.*, fl. Brit. India 5:740. 1890., Chowdhery, Orch. Fl. of Arunachal Pradesh, 308. 1998, I.C. Baruah, Orch Fl Kamrup dist; 174, 2001

Callista lituiflora (Lindley) Kuntze; *Dendrobium hanburyanum* Reehinger *f.*

Epiphytic, stems with nodes and internodes, striated; leaves coriaceous, 7cm long, 1.6cm breath, absent during flowering.

Flowering: April – June

Exsiccatu: Deopani, Nath & Das, SCBOT 0055

Distribution: Chinese, Myanmar, Thailand, Laos, Vietnam, Bangladesh, Eastern Himalayas, India: Assam.

Dendrobium moschatum (Buchanan-Hamilton) Swartz in Schrader, Neu. Jour. Bot. 1:94. 1805; King & Pantling in Ann. Roy. Bot. Grand. Calcutta 8: 60, t. 84. 1898., Chowdhery, Orch. Fl. of Arunachal Pradesh, 311. 1998, I.C. Baruah, Orch Fl Kamrup dist; 159, 2001

Callista calceola (Carey *ex* Hooker) Kuntze; *Callista moschata* Kuntze; *Cymbidium moschatum* Willdenow

Epiphytic, stems terete 40 to 50 cm long, stout; leaves oblong, acute, obliquely notched, 7 to 15 cm long, 3 to 5 cm breath; inflorescence raceme, deflexed laxly 10 to 20 flowered; flowers 6 to 7cm across.

Flowering: May – June

Exsiccatu: Abhoypur, Nath & Das, SCBOT 0042

Distribution: Bangladesh, Nepal, Bhutan, Sikkim, Myanmar, Hainan China, Thailand, Laos, Vietnam, Lower India, Western Himalayas and Eastern Himalayas and Assam.

Dendrobium nobile Lindley, Gen. Sp. Orchid. 79. 1830; Hooker *f.*, Fl. Brit. India 5:740. 1890; King & Pantling in Ann. Roy. Bot Gard. Calcutta 8: 51, t. 71. 1898., Chowdhery, Orch. Fl. of Arunachal Pradesh, 314. 1998

Callista nobilis (Lindley) Kuntze; *Dendrobium coerulescens* Wallich; *Dendrobium formosanum* [Rechinger *f.*] Masamune

Epiphytic; stems erect; leaves coriaceous, oblong, apex obtuse and obliquely notched; 7 to 10 cm in length, breadth 2 to 3 cm; flowers 5 to 7cm across.

Flowering: April – May.

Exsiccatu: Jeypore, *Nath & Das, SCBOT 0051*

Distribution: China, Nepal, Bhutan, Sikkim, Myanmar, Thailand, Laos, Vietnam, India: Eastern Himalaya and Assam.

Dendrobium stuposum Lindley in Bot. 5. 24: t. 65. 1838; Hooker *f.*, Fl. Brit. India 5: 749. 1890; King & Pantling in Ann. Roy. Bot. Gard. Calcutta 8:55, t. 78. 1898, Chowdhery, Orch. Fl. of Arunachal Pradesh, 322. 1998

Callista flavidula (Ridley *ex* Hooker *f.*) Kuntze; *Callista stuposa* (Lindley) Kuntze; *Dendrobium exsculptum* Teijsmann; *Dendrobium flavidulum* Ridley *ex* Hooker *f.*; *Dendrobium pristinum* Ames

Epiphytic, erect herbs, stems tufted, narrow at base, sulcate, terete. Leaves narrowly oblong, slightly notched at apex, Inflorescence 1- 2 flowered, flowers white, floral bracts linear-oblong, ovate, lip with dull yellow blotches, 3 lobed, side lobes truncate, ciliate- erose at apex, mid lobe ovate- orbicular; disc gland- tipped hairy. Column broad.

Flowering: June – August

Exsiccatae: Jeypore *Nath & Das SCBOT 0225*

Distribution: Bhutan, Myanmar, Thailand, Malaysia, Yunnan China, Java, Borneo, Sumatra, India: Sikkim, Assam and Eastern Himalayas.

Dendrobium sulcatum Lindley, Bot. Reg.n. 5.24: t.65. 1838; Hook.f., Fl. Brit. India 5:749. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 55, t.78.1989., Pradhan, Indian Orch., 1979; Chowdhery, Orch. Fl. Arunachal Prad., 322, 1998; Kumar et. Monilal, Cal. Ind Orchh; 72, 1994. I.C.Baruah, Orch Fl Kamrup dist; 168, 2001.

Callista sulcata (Lindley) Kuntz

Epiphytic, stems stout, 15 to 25 cm long, with nodes and internodes of 3- 5 cm long, Leaves elliptic, Inflorescence 8 to 10 flowered, Flowers pendent, lip ovate.

Flowering: June – August

Exsiccatae: Jeypore *Nath & Das SCBOT 0174*

Distribution: Thailand, Laos, South central China and Myanmar, India: Assam, Eastern Himalaya

Dendrobium terminale Parish. & Reichb *f.* in Trans. Linn. Soc. 30:149. 1859; Hooker *f.*, Fl. Brit. India 5: 725. 1890; King & Pantling in Ann. Roy. Bot. Grad. Calcutta 8:42, t.55.

1898, Chowdhery, Orch. Fl. of Arunachal Pradesh, 322. 1998

Aporum terminale (E.C. Parish & Rechinger f.) M.A. Clement; *Aporum verlaquii* (Constantin) Rauschert; *Callista terminalis* (C.S.P. Parish & Rechinger f.) Kuntze; *Dendrobium verlaquii* Constantin

Epiphytic, stems terete at base; leaves elliptic oblong, 1 to 2 cm in length, 0.3 to 0.5 cm in breadth, equitant, fleshy; flowers white.

Flowering: July- January.

Exsiccatu: Abhoypur, Nath & Das, SCBOT 0113

Distribution – Bhutan, Myanmar, Malaysia, Penninsular Thailand, Vietnam, China, India: Eastern Himalayas, Sikkim and Assam.

Dendrobium transparens (Wallich ex Lindley) Lindley, Gen. Sp. Orchid. 79. 1830; Hooker f., Fl. Brit. India 5: 738. 1890., Chowdhery, Orch. Fl. of Arunachal Pradesh, 327. 1998

Callista transparens (Wallich) Kuntze ; *Dendrobium henshalli* Rechinger f .

Epiphytic, stem slender, thick nodes, 30 to 60 cm long; leaves linear lanceolate, apex oblique length 7 to 10 cm , 1 cm in breadth; flowers 3cm across; floral bract broadly lanceolate, scarious; sepals acute; petals ovate, apex blunt; lip clawed at the base, side lobes broad erose, terminal lobe undulate; column with two horn like at the apex.

Flowering: April – May

Exsiccatu: Abhoypur, Nath & Das, SCBOT 0025

Distribution: Bangladesh, Nepal, Bhutan, Myanmar in dense wet forests, India, Sikkim, Western Himalayas and Eastern Himalayas and Assam.

DISCUSSION AND CONCLUSION

The tropical evergreen forests of upper Assam are rich in orchid diversity which is mainly due to their unique climatic condition. These forests are the ideal habitat of about 60% of the *Dendrobium* species of Assam. Out of these 14 species, *D. kentrophyllum* and *D. chrysotoxum* has been reported for the first time from the region. The former was collected from Abhoypore reserve forest and the later one from Digboi reserve forest. Some of the species like *D. aphyllum*, *D. lituiflorum*, *D. fimbriatum*, *D. moschatum* and *D. aduncum* are commonly grown by the people of the region for their aesthetic beauty which are mainly collected from the wild. Species like *D. nobile*, *D. chrysotoxum*, *D. kentrophyllum*, *D. fimbriatum*, *D. cumulatum*, *D. cathcartii* and *D. terminali*, are rare in distribution. These rare species generally occurs in undisturbed forest sites and they grow in tall tree canopies. Hence habitat disturbance and forest fragmentation has resulted in the rarity of the species. Illegal trading of *D. lituiflorum* from Lohit district of Arunachal Pradesh through Assam was observed which may encourage the business in Assam also. However collection of these species from the wild for commercial purpose has not been observed. Therefore, there is a major scope for the development of commercial cultivation of these species in the region as they can be grown without much effort as they use to grow in tree species like areca-nut, coconut, mango, etc. in the common household.

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