

## DIVERSITY AND DISTRIBUTION OF THE GENUS *PHALAEOPSIS* BLUME (ORCHIDACEAE) IN ASSAM, INDIA

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### ABSTRACT

Among the Orchid flora of Assam 5 species of *Phalaenopsis* recorded *Phalaenopsis deliciosa*, *Phalaenopsis lobbii*, *Phalaenopsis mannii*, *Phalaenopsis parishii*, and *Phalaenopsis taenialis* in an intensive survey during 1996-2011. The present paper deals *Phalaenopsis* species diversity and distribution in Assam, India. This attempt is the first step to correct taxonomic identification to workout currently accepted botanical names with present ecological status, date of collection, Voucher specimen numbers, habitat, altitudinal ranges, phenology and local and general distribution of *Phalaenopsis* species in the region.

**Key words:** *Phalaenopsis*, Species Diversity, Distribution, Status, Assam.

### INTRODUCTION

The Indian state, Assam is the gateway of the North East region, bears a separate identity phytogeographically and represents a number of different types of plant communities. Its unique ecosystem favors the luxuriant growth of plants considered a Nature's reservoir of plants resources-unparalleled compared to any place in the world with regards to its richness of floristic composition. Almost all varieties of plants relating to different climatic conditions are found in the state where as Orchids are a major interesting component of vegetation (Bhagabati *et al.*, 2006). 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 store house of Indian orchid species. The forests of Assam possess a large number of beautiful important Orchids (Gogoi *et al.* 2009). The total number of orchid species may be around 193 under 71 genera out of which 27 are endemics. Some Orchids are associated with the culture of Assamese people from past.

The genus *Phalaenopsis* was first described by Carl Ludwig Blume in 1825. The generic name means "Phalaena-like" and is probably a reference to the genus *Phalaena*, the name given by Carolus Linnaeus to a group of large moths; the flowers of some species supposedly resemble moths in flight. For this reason, the species are sometimes called

Moth orchids. *Phalaenopsis* are mostly epiphytic shade loving orchid; a few are lithophytes. In the wild, some species grow below the canopies of moist and humid lowland forests, protected against direct sunlight; others grow in seasonally dry or cool environments. *Phalaenopsis* shows a monopodial growth habit. A single growing stem produces one or two alternate, thick, fleshy, elliptical leaves a year from the top while the older, basal leaves drop off at the same rate. The inflorescence, either a raceme or panicle, appears from the stem between the leaves. They bloom in their full glory for several weeks.

The genus consists of 46 species, distributed in India, S. E. Asia, Indonesia, Philippines and N. Australia. 7 species reported from India, 5 in Assam.

*Phalaenopsis cornu-cervi* (Breda) Blume & Reichb. f. (Chowdhury, 2005) and *Phalaenopsis pulcherrima* (Lindl.) J.J.Sm. (Bhagabati *et al.*, 2006 as *Phalaenopsis mastersii* King & Pantl.) was recorded from Assam but the present authors could not confirm it because they have not seen the specimens in the wild.

### MATERIALS AND METHODS

The present investigation is the outcome of several field trips during the year 2006 - 2011 covering all the seasons of the year in the entire forest areas of Assam.

All the species found were recorded in the field note book with their necessary information. The freshly collected *Phalaenopsis* specimens were dissected and examined in laboratory during flowering period. Herbarium specimens were prepared by standard methods (Jain and Rao, 1977). Specimens were identified and authenticated with the help of the standard orchid manuals. Finally all the Voucher specimens were and by matching at the Herbarium of the Department of Botany, Guwahati University. The specimens are deposited in the Herbarium, Department of Botany, Guwahati University. In the enumeration a generic name is provided with its author. All the plant specimens are arranged alphabetically as per their local distribution in the area with botanical names, voucher specimen numbers, date of collection, habitat and phenology.

#### ENUMERATION

***Phalaenopsis deliciosa*** Rchb.f., Bonplandia (Hannover) 2: 93. 1854. *Kingidium deliciosum* (Rchb.f.) H.R.Sweet, Amer. Orchid Soc. Bull. 39: 1095. 1970. *Doritis deliciosa* (Rchb.f.) T.Yukawa & K.Kita, Acta Phytotax. Geobot. 56: 156. 2005. *Kingidium deliciosum* f. *album* O.Gruss, Orchidee (Hamburg) 57: 69. 2006. *Phalaenopsis deliciosa* f. *alba* (O.Gruss) Christenson, Richardiana 8: 29. 2008 [Fig. 1].

Epiphyte. Stems 1–1.5 cm. Leaves 3 or 4, persistent, obovate-lanceolate or elliptic, 8–14.5 × 3–5.5 cm, papery, margin undulate, apex acute and slightly curved. Inflorescence 10–15 cm, branched, densely several flowered. Flowers yellowish green with pale purple stripes or markings. Dorsal sepal subelliptic, 6–7 × 3–3.5 mm, obtuse; lateral sepals obliquely ovate, 5.5–6 × 3.5–4 mm, base adnate to column foot, apex obtuse. Petals subobovate, 5–5.5 × 2.7–3 mm, obtuse; lip not clawed at base, 3-lobed; lateral lobes erect, obliquely elliptic-obovate, 4 × 2.5 mm, rounded, with toothlike flaps, base decurrent and forming a broadly conic spur with base of mid-lobe, mid-lobe spreading horizontally, obovate-cuneate, 6 × 5 mm, apex deeply emarginate, with a thickened central longitudinal ridge. Column 3 mm, foot 2 mm.

**Voucher specimen:** Gogoi *et al* 0210. Flowering: May – July. Habitat: Epiphyte in gallery forest along a large river, in a shady spot in humid evergreen forest. Distribution: Vietnam, Peninsular Malaysia, Sumatra, Java, Borneo, Sulawesi, Philippines.

***Phalaenopsis lobbii*** (Rchb.f.) H.R.Sweet, Gen. Phalaenopsis: 53. 1980 [Fig. 2].

Epiphytic plants. Stem short, completely enclosed by imbricate leaf sheaths. Leaves sub-basal, thin, slightly fleshy, 3–5, usually 2 at flowering time, largely elliptic, 9–11 × 3.5–4 cm, obliquely notched at apex. Inflorescence racemose, slender, shorter than the leaves, laxly with 2 to 6 flowers. Flowers fully open, almost 1.5 cm across, sepals and petals creamy-white, mid-lobe of lip with two chestnut-rusty vertical bands, column white; dorsal sepal oblong-elliptic, 8 × 5 mm, apex obtuse. Lateral sepals obliquely ovate or sub-orbicular, 6 × 4 mm, obtuse. Petals cuneate or narrowly obovate, 7 × 3 mm, apex obtuse or rounded. Lip shortly clawed, adnate to the column foot, three-lobed, side-lobes erect, falcate, acute, 3 × 1 mm; mid-lobe broadly triangular, fleshy, concave, apex rounded, 6 × 10 mm; disc of lip with 4 filiform segments. Column short, slightly curved, 4–5 mm long.

**Voucher specimen:** Gogoi *et al* 0710. Flowering: April- May. Habitat: Epiphyte in forest along a river, in a shady spot in humid evergreen forest. Distribution: India, Bhutan, Myanmar and Vietnam, China.

**Note:** *Phalaenopsis lobbii*, a species is similar to *P. parishii* Rchb. f., but it is not difficult to distinguish them. *Phalaenopsis lobbii* has white flowers and not zigzag rachis.

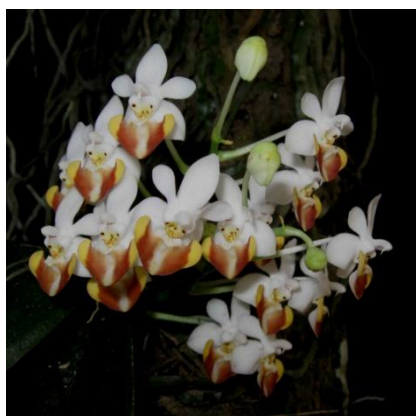
***Phalaenopsis mannii*** Rchb.f., Gard. Chron. 1871: 902. 1871; Hook. f., Fl. Brit. India, 6: 30. 1890; Pradhan, Indian Orchid-II. 542. 1979; Kumar et. Monilal, Cat. Ind. Orch. 83. 1994; Chowdhery, Orch. Fl. Arunachal Prad. 587. 1998; *Polychilos mannii* (Rchb.f.) Shim, Malayan Nat. J. 36: 24. 1982. *Phalaenopsis boxallii* Rchb.f., Gard. Chron. n.s., 19: 274. 1883. *Phalaenopsis mannii* f. *flava* Christenson, Phalaenopsis: 90. 2001 [Fig. 3].

Fig. 1: *Phalaenopsis deliciosa*.Fig. 2: *Phalaenopsis lobbii*Fig. 3: *Phalaenopsis mannii*

Epiphytic. Stems stout, 1.5–7 cm, 4 to 5 leaved. Leaves oblong-oblancheolate, 20–23 × 5–6 cm, base cuneate, apex acute. Inflorescences 1 or 2, ascending or pendulous, 5.5–30 cm, unbranched or sometimes branched, many flowered. Flowers opening widely, long-lasting, thickly textured, waxy, glossy, sepals and petals yellow with dark brown spots and bars, lip mid-lobe white, column yellow. Dorsal sepal obovate-lanceolate, 15–18 × 5–7 mm, acute; lateral sepals obliquely ovate-elliptic, 15–18 × 7–9 mm, acute. Petals suboblong, 13–15 × 4–5 mm, acute. Lip 1 cm, base with a claw, 3-lobed; lateral lobes erect, pressed, oblong-subquadrate, 4 × 2 mm, obliquely truncate; mid-lobe transverse, anchor-shaped, margin fimbriate-erose, apex a swollen knob with sparse trichomes. Column 8 mm, foot 4 mm.

**Voucher specimen:** Gogoi *et al* 0344. Flowering: March – May. Habitat: Epiphytic on tree trunks in broad-leaved evergreen forests. Distribution: NE India, Bhutan, China, Myanmar, Nepal, Vietnam.

***Phalaenopsis parishii*** Rchb.f., Bot. Zeitung (Berlin) 23: 146. 1865; Hook.f. Fl. Brit. India, 6: 31, 1890; Pradhan, Indian Orchid-II, 541, 1979; Kumar *et. Monilal*, Cat. Ind. Orch., 83, 1994; Chowdhery, Orch. Fl. Arunachal Prad., 587, 1998; Chowdhery & Pal, Orch. Arunachal Prad., 123, 1997. *Grafia parishii* (Rchb.f.) A.D.Hawkes, Phytologia 13: 306. 1966. *Polychilos parishii* (Rchb.f.) Shim, Malayan Nat. J. 36: 25. 1982. *Doritis parishii* (Rchb.f.) T.Yukawa & K.Kita, Acta Phytotax. Geobot. 56: 157. 2005. *Aerides decumbens* Griff., Not. Pl. Asiat. 3: 365. 1851. *Kingiella decumbens* (Griff.) Rolfe, Orchid Rev. 25: 197. 1917. *Biermannia decumbens* (Griff.) Tang & F.T.Wang ex Merr. & Metcalf, Lingnan Sci. J. 21: 7. 1945. *Phalaenopsis decumbens* (Griff.) Holttum, Gard. Bull. Singapore 11: 286. 1947. *Kingidium decumbens* (Griff.) P.F.Hunt, Kew Bull. 24: 97. 1970. *Polychilos decumbens* (Griff.) Shim, Malayan Nat. J. 36: 28. 1982 [Fig. 4].

Fig. 4: *Phalaenopsis parishii*Fig. 5: *Phalaenopsis taenialis*.

Very rare epiphyte; stems clustered, abbreviated, branching basally; leaves 2–4, subbasal, broadly elliptic, 5–8 × 3.5–4 cm, obliquely bilobed; inflorescences erect racemes, 5–10 cm, 2–4-flowered; flowers white, swollen base of column with a few irregularly distributed brown spots, with a regular pair of darker brown spots below apices of swellings, leading edges of lateral lobes of lip brown spotted, mid-lobe white with 2 broad, longitudinal chestnut-brown stripes; pedicel and ovary to 1.5 cm; dorsal sepal oblong-elliptic, concave, to 10 × 5 mm, obtuse; lateral sepals somewhat reflexed, obliquely ovate to suborbicular, to 8 × 7 mm, obtuse-rounded, adnate to column foot; petals obovate-subspatulate, to 8 × 4 mm, obtuse-rounded; lip 3-lobed; lateral lobes erect, falcate, parallel to middle and then diverging and forming a U-shaped structure, acute; mid-lobe reniform, concave with lateral margins shallowly incurved, rounded-obtuse; column to 5 mm, somewhat arcuate.

**Voucher specimen:** Gogoi et al 0258. Flowering: March – April. Habitat: Epiphytic on tree trunks in open forests. Distribution: India, China, Bhutan, Myanmar, Vietnam.

***Phalaenopsis taenialis*** (Lindl.) Christenson & Pradhan, Indian Orchid J. 1: 154. 1985. *Aerides taenialis* Lindl., Gen. Sp. Orchid. Pl.: 239. 1833. *Doritis taenialis* (Lindl.) Hook.f., Fl. Brit. India 6: 31. 1890. *Kingiella taenialis* (Lindl.) Rolfe, Orchid Rev. 25: 197. 1917. *Biermannia taenialis* (Lindl.) Tang & F.T.Wang, Acta Phytotax. Sin. 1: 96. 1951. *Kingidium taeniale* (Lindl.) P.F.Hunt, Kew Bull. 24: 98. 1970. *Polychilos taenialis* (Lindl.) Shim, Malayan Nat. J. 36: 28 (1982). *Aerides carnosus* Griff., Not. Pl. Asiat. 3: 365. 1851 [Fig. 5].

Epiphytic. Stems inconspicuous. Leaves basal, few, often deciduous, usually only 1 leaf

persistent, suboblong, 1–3.5 × 4–13 mm. Inflorescence borne from base of stem, 6.5–19 cm, unbranched, 1-2-flowered. Flowers opening widely, sepals and petals pale pink, lip and anther cap rose-purple; pedicel and ovary 1.5 cm. Dorsal sepal oblong, 8–9 × 4 mm, obtuse; lateral sepals subelliptic, 9.5 × 4.5 mm, base adnate to column foot, apex obtuse. Petals obovate-spatulate, 9 × 4 mm, rounded; lip 3-lobed; lateral lobes erect, subfusiform, 5 × 1.5 mm, adaxially with a slightly thickened longitudinal ridge close to proximal margin, apex subtruncate; mid-lobe flat, spatulate, 7 × 3 mm, base with a broad furcate-lobed appendage, apex rounded; spur 3 mm. Column 5 mm, stout, broadly dilated at stigma, foot 3 mm.

**Voucher specimen:** Gogoi et al 0721. Flowering: January. Habitat: Epiphytic on tree trunks in forests. Distribution: China, Bhutan, NE India, Myanmar, Nepal, Thailand.

## RESULTS AND DISCUSSION

During recent field studies of five species of *Phalaenopsis* recorded *Phalaenopsis deliciosa*, *Phalaenopsis lobbii*, *Phalaenopsis manni*, *Phalaenopsis parishii*, and *Phalaenopsis taenialis*. Out of five *Phalaenopsis lobbii* found to be new report for Assam, all the *Phalaenopsis* species are very rare and the populations are restricted in some particular area. It is also observed that the host tree which supports the epiphytic Orchid species in wild habitat found to be diminished continuously in the region and effective control measures have been taken to control such devastation. Therefore, conservation of forest means to conserve the epiphytic Orchid species which automatically support the lavish growth of rarely found *Phalaenopsis* in the region.

## LITERATURE CITED

- Barua IC, 2001.** *Orchid Flora of Kamrup District*. Bishen Singh Mahendra Pal Singh, Dehra Dun India.
- Bhagabati AK, Kalita MC & Baruah S, 2006.** *Biodiversity of Assam*. Assam Science Society, Guwahati, Assam, India.
- Chen X, Liu Z, Zhu G, Lang K, Ji Z, Luo Y, Jin X, Cribb PJ, Wood JJ, Gale SW, Ormerod P, Vermeulen JJ, Wood HP, Clayton D & Bell A, 2009.** *Orchidaceae*, in Wu Z, Raven PH & Hong D (eds), *Flora of China*, vol. 25. Science Press, Beijing; Missouri Botanical Garden Press, St. Louis, USA.
- Chowdhery HJ, 1998.** *Orchid Flora of Arunachal Pradesh*. Bishen Singh Mahendra Pal Singh, Dehra Dun, India.
- Chowdhery S, 2005.** *Assam's Flora*. Assam Science Technology and Environment Council, Guwahati, Assam, India.

- Gogoi K, Borah RL and Sharma GC, 2009.** Orchid flora of Joypur Reserve Forest of Dibrugarh district of Assam, India, in: *Pleione*, **3**(2): 135-147.
- Hooker JD, 1890.** Orchidaceae. In: *Flora of British India*. L. Reeve and Co., Ashford, Kent. V: 687 – 864 & VI: 1 – 198.
- Jain SK and Rao RR, 1977.** A Handbook of Field & Herbarium methods. Today & Tomorrow's Printers & Publishers, New Delhi.
- King G and Pantling R, 1898.** The orchids of the Sikkim Himalayas. *Annals of the Royal Botanical Garden Calcutta* **8**: 1-342.
- Lindley J, 1830-1840.** *The genera and species of Orchidaceous plants*. Ridgways. London.
- Lucksom SZ, 2007.** *The Orchids of Sikkim and North East Himalaya: Development Area*, Jiwan Thing Marg, Gangtok, East Sikkim.
- Misra S, 2007.** *Orchids of India*. Bishen Singh Mahendra Pal Singh, Dehra Dun, India.
- Pearce NR and Cribb PJ, 2002.** *The Orchids of Bhutan*. **3** (3): in *Flora of Bhutan*. Royal Botanic Garden, Edinburgh.
- Pradhan UC, 1979.** *Indian Orchids Guide to Identification and Culture*. Vol- II. Thomson Prass, Faridabad, India.
- Seidenfaden G, 1962.** *The Orchids of Thailand*. The Siam Society, Bangkok.