

BOTANICAL DESCRIPTION AND PRESENT ECOLOGICAL STATUS OF *AGROSTOPHYLLUM* BLUME, A LESS KNOWN EPIPHYTIC ORCHID SPECIES OF DARJEELING HIMALAYA OF INDIA

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ABSTRACT

The present paper deals botanical description with four *Agrostophyllum* epiphytic Orchid species viz., *Agrostophyllum brevipes*, *A. callosum*, *A. myrianthum* and *A. planicaule* diversity resources and distribution in Darjeeling Himalaya of India. This attempt is the first step to correct taxonomic identification to workout currently accepted botanical names with ecological status, voucher specimen numbers, habitat, altitudinal ranges, phenology and local and general distribution of *Agrostophyllum* species in the regions. For the assessment of present ecological status, plot of 10m x 10m quadrates was laid down diagonally in the field for epiphytic Orchid species.

Key words: *Agrostophyllum* orchid species, Botanical description, Diversity, Status, Darjeeling Himalaya.

INTRODUCTION

Orchids belong to the highly evolved family Orchidaceae which comprise one of the most significant components of rich and diversified floristic wealth of India. In Darjeeling Himalaya, due to the congenial climatic conditions and topographical variation, it is rich in terrestrial Orchid diversity. In India, Orchids form 9% of our flora and are the largest and highly advanced botanical family of higher plants (Bose and Bhattacharya, 1999). It is estimated that at about 25,000-35,000 species with 800-1,000 genera are distributed throughout the world. About 1300 species with 140 genera of Orchid species are found in India with temperate Himalayas as their natural home (Yonzone and Kamran, 2008).

The genus *Agrostophyllum* was established in 1825 by C.L. Blume in his *Bijdragen tot der Flora van Nederlandsch Indie*. The genus comprises about 50 species distributed from the Seychelles and Tropical Asia to the Pacific Islands.

MATERIALS AND METHODS

The intensive field survey was conducted during the year 2007-2011 covering all the seasons of the year in the entire Darjeeling district including the forest

areas, floral nurseries and farms of as low as Siliguri which is located at 150m to as high as Sandakphu-Phalut located at 3636m of the entire Darjeeling district of West Bengal. While working on Orchid flora of Darjeeling Himalaya, all the *Agrostophyllum* species found were recorded in the field notebook with their necessary information. The collected specimens were dissected and examined in the laboratory during flowering period. Herbarium specimens were prepared by standard methods (Jain and Rao, 1977), specimens so collected were processed, preserved and mounted on herbarium sheets and described, properly identified and authenticated with the help of the The Orchids of the Sikkim Himalaya (King and Pantling, 1898); Orchids of Sikkim and North East Himalaya (Lucksom, 2007); the Flora of Bhutan (Pearce and Cribb, 2002). Finally all the Voucher specimens were deposited in the Herbarium of Department of Botany, St. Joseph's College, North Point, Darjeeling and Taxonomy and Ethnobiology Research Laboratory, Cluny Women's College, Kalimpong. All the plant specimens are arranged alphabetically as per their altitude wise distribution in the area with botanical names, date of collection, voucher specimen numbers, habitat and phenology.

For ecological status, nested quadrat sampling method with plot of 10m x 10m quadrates for epiphytic orchid species was laid down diagonally in the field as suggested by (Philips, 1959).

Study region

Darjeeling is the vegetation rich and Orchid species resourceful Northern most district of West Bengal. The district is subdivided into four Sub-Divisions viz., Darjeeling sadar; Kalimpong, Kurseong and Siliguri (Fig. 1). It is bordered by Sikkim in the north, Terai and Dooars in the south, Bhutan in the east and Nepal in the west. The district has two topographical features. Darjeeling, Kurseong and Kalimpong form the hill areas whereas Siliguri is stationed at the foothill in a vast stretch of the plains. The shape of the district is triangular. The altitudinal variations of the district range from 150m at Siliguri to 3636m at

Sandakphu-Phalut with a sharp physiographic contrast between the plain and the mountainous regions. The present investigation deals with diversity and the distributional record with Voucher specimen, habitat, local distribution within Darjeeling, date of collection, flowering and fruiting time, altitudinal ranges, general distribution of four *Agrostophyllum* Orchid species available in Darjeeling Himalaya of West Bengal, India. Perennial epiphytic herb. Stem clustered, erect or pendent, bilaterally flattened, leafy, internodes. Leaves distichously, narrow, sheaths black to brown, overlapping. Inflorescence terminal, usually globose with flowers borne on an elongate axis, or paniculate. Flowers numerous, minute, resupinate. Sepals and petals similar, free; lateral sepals forming a mentum with saccate lip base. Lip entire to 3-lobed, saccate. Column short to long; foot rudimentary; pollinia 8, within viscidium.

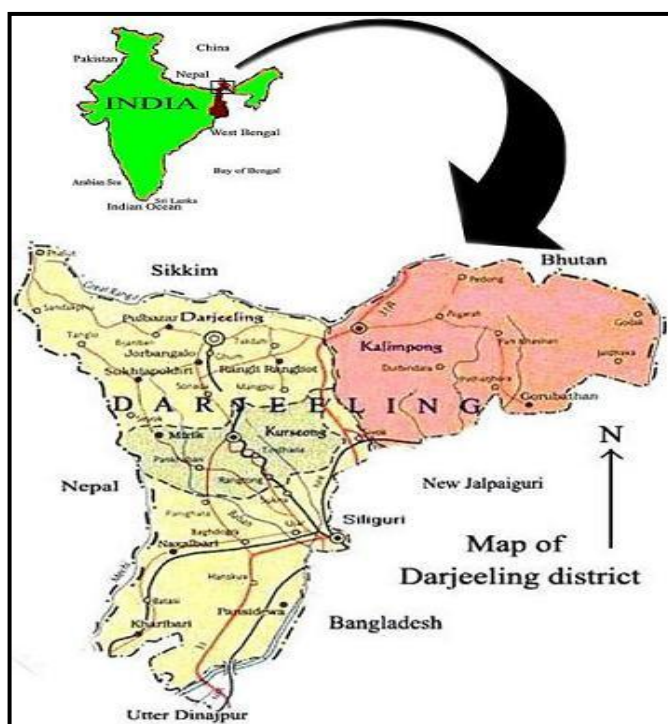


Fig. 1: Location of Darjeeling district (study area) of West Bengal, India

RESULTS AND DISCUSSION

During recent field studies in the Darjeeling Himalaya of India, four *Agrostophyllum* Orchid species were recorded. Of them, two are sparse, one is common and another one is threatened status in the region. In general, the habitat of

Agrostophyllum is epiphytic but rarely available in lithophytic habitat. *Agrostophyllum brevipes* flower from May to June. The diversity of Orchid species are largely depends upon the altitudinal ranges of the regions.

Altitudinally, the district Darjeeling can be classified into four different categories. (i) Tropical zone is 120-1000m high from the mean sea level (ii) Sub-Tropical zone 1000-1800m (iii) Temperate and Sub-Temperate zone is ranges from 1800-3500m and (iv) Sub-Alpine zone which is above 3500m from sea level (Yonzone *et al.*, 2012a). *Agrostophyllum brevipes* available within the altitudinal ranges of 400-166m but the flowering of *A. callosum* is March to June and available within the altitudinal ranges of 600-2200m similarly *A. myrianthum* and *A. planicaule* both the species flower in the months of July to August but availability within the altitudinal ranges is different. Former available within 200-1600m and the latter available within 500-2100m altitudinal ranges. It is observed that the luxuriant growth and diversity of the Orchid species in the undisturbed sites of the study area and the meager development in distressed sites clearly indicates the change in the microclimatic conditions in habitat by anthropogenic activities (Yonzone *et al.*, 2012b).

Enumeration

1) *Agrostophyllum brevipes* King & Pantling in Ann. Roy. Bot. Gard. (Calcutta) 8: 156, t.213. 1898. *Agrostophyllum callosum sensu* Hook. f., Fl. Brit. India 5(2): 824 p.p. 1890. Plant 18-34cm tall; rhizome 2.8-3mm thick, slender, covered by linear scales. Stem 2.5-3cm apart on rhizome, 8-13cm tall, covered with overlapping sheaths. Leaves 5-15x0.5-1cm, 3 or 4, arising from apex of stem, alternate, linear-oblong, apex emarginated, subacute, margins entire. Inflorescence 1.1-1.4cm long, globose, surrounded by leaf bases, densely many-flowered. Flowers 4-5mm across; sepals, petals and lip white, column and anther dark crimson.

Voucher specimen: [Rajendra *et al.* 1181]; **Habitat:** Epiphytic; **Flowering:** May–June; **Altitudinal ranges:** 400–1600m; **Date of collection:** 23 May 2010; **Status:** Sparse; **Local distribution within Darjeeling:** 27th mile NHPC Hydroelectro Power Project side, Algarah, Panbu – Kalimpong; **General distribution:** N.E. India, Thailand and Laos.

2) *Agrostophyllum callosum* Rchb. f. in Seeman, Fl. Vit.: 296. 1868.

Plant 23-41cm tall; rhizome sheathed. Stem wider at apex than base, covered in overlapping sheaths. Leaves 6-17x0.9-1cm, many up stem, alternate, linear-oblong, tapering gradually to emarginated

apex, apex bifid. Inflorescence 2.6-2.9cm across, capitate-globose, densely many-flowered. Flowers 4-5mm long; sepals, petals and lip reddish-pink, column deeper purple.

Voucher specimen: [Rajendra *et al.*, 0345]; **Habitat:** Epiphytic; **Flowering:** March–July; **Altitudinal ranges:** 600–2200m; **Date of collection:** 27 April 2008; **Status:** Common; **Local distribution within Darjeeling:** Forest areas in Lungshel, Lava, Nokdara, Algarah, Kaffer – Kalimpong; **General distribution:** Nepal, N.E. India, China and Thailand.

3) *Agrostophyllum myrianthum* King & Pantling in Ann. Roy. Bot. Gard. (Calcutta) 8: 155, t.211. 1898. Plant 37-43cm tall. Stems 3-4cm apart on rhizome, widening covered with overlapping sheaths. Leaves 8-12x0.8-1.3cm, alternate, linear-oblong, emarginated to apex, obtuse, base sessile, sheathing. Inflorescence 2.8-3cm across, globose, densely many-flowered. Flowers 2.8-3mm across, yellowish.

Voucher specimen: [Rajendra *et al.* 1429]; **Habitat:** Epiphytic; **Flowering:** July–August; **Altitudinal ranges:** 200–1600m; **Date of collection:** 17 August 2010; **Status:** Sparse; **Local distribution within Darjeeling:** Forest areas in Kumsi, Teesta River sides–Kalimpong; Rambi – Kurseong; **General distribution:** N.E. India

4) *Agrostophyllum planicaule* (Wall. ex Lindl.) Rchb. f. in Walpers, Ann. Bot. Syst. 6: 909. 1864. *Eria planicaulis* Wall. ex Lindl. in Bot. Reg. 26: 8, misc.8, no.4. 1840. *Agrostophyllum khasianum* Griff. in Calcutta J. Nat. Hist. 4: 376, t.19. 1844. *Appendicula hasseltii* Wight, Icon. Pl. nd. Orient. 5: 20. 1852. *Agrostophyllum hasseltii* (Wight) Rchb. f., in Walpers, Ann. Bot. Syst. 6: 909. 1864. Plant 23-31cm tall. Stems 7-10cm long, fusiform, compressed, covered by overlapping sheaths. Leaves 7-14.5x1.6-2.2cm, 3 or 4, terminal, distichous, alternate, narrowly ovate-oblong. Inflorescence 2-2.3cm across, globose-capitate, densely many-flowered. Flowers 4-5mm across; sepals, petals and lip cream-white, with patches of pale yellow on mid-lobe of lip.

Voucher specimen: [Rajendra *et al.* 0652]; **Habitat:** Epiphytic; **Flowering:** July–August; **Altitudinal ranges:** 500–2100m; **Date of collection:** 12 August 2008; **Status:** Threatened; **Local distribution within Darjeeling:** Kalijhora forest–Kurseong; Soureni–Mirik; **General distribution:** Nepal, N.E. India,

Myanmar to S.E. Asia.

CONCLUSION

As the habitat of *Agrostophyllum* species is epiphytic it needs good supporting trees for better survive. The undisturbed habitat rich forest is ideal for its lavish growth and development. From floricultural point of view, it can grow in the plastic or earthen pots with potting mixture of brick pieces, dry barks, decay woods and charcoal. It has good foliage ornamentation which remains almost green throughout the year and can choose for room and home decoration. But the indiscriminate collection by floral businessmen and deforestation cause greater harm in the natural population of this botanically less known epiphytic Orchid *Agrostophyllum* in the study regions. The felling of host trees should be cleared only after examination of such plants by conservationists or botanists. The random felling of trees and the general deforestation associated with commercial plantations should be stopped immediately (Yonzone *et al.*, 2012c). Man made multifarious

activities are the major threat in the region. Besides this, landslides and top layer soil erosion also cause the greater harm to the species but not greater as that of human activities (Yonzone *et al.*, 2011). The random collections of Orchid species in business scales have almost wiped out the Orchids population in wild habitat, except for the tall tree epiphytes and terrestrial Orchids. The local collectors and floral nurseries and farms are responsible for this damage. The extension of agricultural lands, rapid deforestation and various developmental schemes directly damage the natural population of Orchids in Darjeeling Himalaya. So it needs to work out the appropriate protection strategies and also to save from harm their survival in natural habitats.

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