DIVERSITY RESOURCES, DISTRIBUTION AND PRESENT ECOLOGICAL STATUS OF *HERMINIUM* R. Br. A LESS KNOWN TERRESTRIAL ORCHID SPECIES OF DARJEELING HIMALAYA OF INDIA

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ABSTRACT

The present paper deals botanical description with five *Herminium viz*., *Herminium jaffreyanum, H. lanceum, H. mackinnonii, H. macrophyllum* and *H. quinquelobum* terrestrial Orchid species 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 *Herminium* species in the regions. For the assessment of present ecological status, plot of 5mx5m quadrates was laid down diagonally in the field for terrestrial orchid species. Of them, three are sparse and the rest two are rare status in the region. June to October is the main flowering seasons of these species. It is found that the diversity and distribution frequency of *Herminium* species is rich and widespread throughout the Darjeeling Himalaya.

Key words: *Herminium* orchid species; diversity; distribution; status, Darjeeling Himalaya.

INTRODUCTION

Orchids belong to the highly evolved family Orchidaceae that comprise one of the most significant components of rich and diversified floristic wealth of India. Darjeeling Himalaya is the Northern most district of West Bengal that covers the hill and mountains that includes the alpine zone in Sandakphu and Phalut to foot hill in Terai at Siliguri with a vast stretches of the plains. Due to the congenial climatic conditions and topographical variation, this region is a natural home for number of Orchid species. 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). 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*., 2012a). The genus *Herminium* was established in 1758 by Linnaeus in his *Opera Veria*. The genus comprises about 50 species widely distributed in Europe, China, Japan and the Indian subcontinent.

MATERIALS AND METHOD

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.

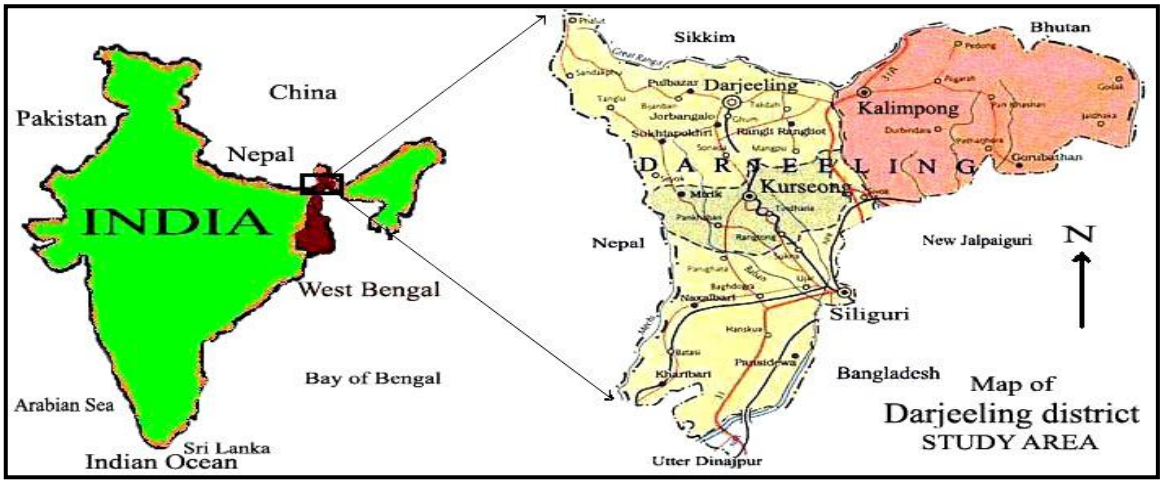

Fig. 1: Location of Darjeeling district (study area) of West Bengal, India

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 five *Herminium* Orchid species available in Darjeeling Himalaya of West Bengal, India. Plants terrestrial, annual tuberous herbs. tubers cylindric. Stem with bladeless sheaths at base. Leaves solitary or few, cauline or radical, sheathing at the base. Inflorescence terminal, racemose, erect, laxly to densely any-flowered; floral bracts small, lanceolate. Flowers green, small, often spider-like; ovary sessile. Sepals subequal; dorsal sepal free or the dorsal conniving with the petals to form a hood, the lateral pair spreading. Petals usually smaller than the sepals. Lip adnate to the base of the column, as long as or longer than the sepals, often fleshy, broad or narrow, entire or 3 or 5-fid, the base concave or very shortly saccate. Column very short; anther 2-locular, adnate to the face of the column; anther locules parallel; pollinia 2; caudicles very short; viscidia 2, small to large; staminodes prominent; stigma 2-lobed, convex, clavate; rostellum short.

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, the *Herminium* (terrestrial Orchid) 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 Orchids of the Sikkim Himalaya (King and Pantling, 1898); Orchid Flora of Arunachal Pradesh (Chowdhery, 1998); Orchids of India (Bose and Bhattacharjee, 1999); 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 areas with botanical names, date of collection, voucher specimen numbers, habitat, phenology and general distribution. For ecological status, nested quadrate sampling method with plot of 5mx5m quadrates for terrestrial species was laid down diagonally in the field as suggested by (Philips, 1959).

RESULTS AND DISCUSSION

During recent field studies in the Darjeeling Himalaya of India, five *Herminium* Orchid species were recorded. Of them, three are sparse and the rest two are rare status in the region. June to October is the main flowering seasons of these species. The diversity of Orchid species are largely depends upon the altitudional ranges of the regions (Yonzone *et al*., 2012b). *H*. *mackinnonii* are available in low altitudinal range *i.e.,* 1100 to 2600m and *H. lanceum* available in as low as 1100 to as high as 4200m altitude, *H. quinquelobum* in 1800 to 2600m and the rest *H. macrophyllum* in 2700 to 4200 and *H. jaffreyanum* are available in 2200 to 3400m altitudinal ranges in the study regions. It is found that the diversity and distribution frequency of *Herminium* species is rich and widespread throughout the Darjeeling Himalaya and is available especially in undisturbed intact habitat rich areas in the regions. The Orchid resources of Darjeeling Himalaya are soon going to be threatened. Therefore, it is very important to take up conservation measures need to work out the suitable protection strategies and also to protect their survival in natural habitats (Yonzone *et al*. 2011).

Enumeration

Herminium jaffreyanum King & Pantling in J. Asiat. Soc. Bengal 65(2): 130. 1896. Plant 9-13cm tall; tuber ellipsoid to subglobose, 0.7-1.2x0.5-0.6cm. Stem sheathed at base, leaves borne in lower half; stem bracts linear-lanceolate, acuminate. Leaves 2, 6-10x0.5-1cm, distant, linear-oblong to oblong, acute, sessile, sheathing at base. Inflorescence densely many-flowered. flowers 2-3mm across, uniformly green. *Voucher specimen*: [Rajendra *et al*. 1682]; *Habitat*: Terrestrial; *Altitudinal ranges*: 2200–3400m; *Flowering*: July – August; *Date of collection*: 13 August 2011; *Present ecological status*: Sparse in habitat; *Local distribution within Darjeeling*: Forest areas in Manaybhanjang, Tonglu, Meghma, Kalpokhari (Border area of Nepal and India); Rachela forest – Kalimpong; *General distribution*: N.E. India.

Herminium lanceum (Thunberg *ex* Sw.) Vuijk in Blumea 11(1): 228. 1961. Plant 26-48cm tall; tubers 1.7-3.5x0.6-1.4cm, ovoid. Stem erect, distantly 3 to 6 leaved, bracteate above leaves. Leaves 3-4, 9-23x0.9-1.8cm, linear to linear-lanceolate, acuminate, sessile, sheathing at base. Inflorescence slender, cylindric, densely many-flowered. Flowers 0.8-1cm long, uniformly greenish-white.

Voucher specimen: [Rajendra *et al*. 0597]; *Habitat*: Terrestrial; *Altitudinal ranges*: 1100–4200m; *Flowering*: July–October; *Date of collection*: 1 August 2008; *Present ecological status*: Sparse in habitat; *Local distribution within Darjeeling*: Dello Hill, forest areas in Algarah, Rachela – Kalimpong; Dilaram – Kurseong; Rammam – Darjeeling; Kalpokhari, Sandakphu (Border area of Nepal and India); *General distribution*: India (Himalayas, Kashmir), Nepal, Myanmar, China, Thailand, S.E. Asia, Korea, Japan, the Philippines and south to Malaysia, Timor, Sulawesi and Java.

Herminium mackinnonii Duthie in J. Asiat. Soc. Bengal 71: 44. 1903. Plant 13-27cm tall; tuber 1.5-2.5x0.8-1.5cm, narrowly cylindric. Stem with leaves inserted near middle, ebracteate above leaves. Leaves 2 or 3, 8-15x1-2cm, subopposite to distant, linear-lanceolate to oblong, acute to shortly acuminate, sessile, sheathing at base, 3 to 5-veined. Inflorescence cylindric, subdensely many-flowered. Flowers 2-2.5mm across; sepals green, petals white, lip white.

Voucher specimen: [Rajendra *et al*. 0124]; *Habitat*: Terrestrial *Altitudinal ranges*: 1100–2600m; *Flowering*: July–August; *Date of collection*: 19 September 2007; *Present ecological status*: Rare in habitat; *Local distribution within Darjeeling*: Dello Hill – Kalimpong; Boggonra –Kurseong; Manaybhanjang – Darjeeling; *General distribution*: N.W. India, Nepal and N.E. India.

Herminium macrophyllum (D. Don) Dandy in J. Bot. 70: 328. 1932. Plant 14-31cm tall; tuber 1-2 x 0.5-1.5cm, ovoid-globose, pubescent. Stem with leaves borne on lower third, ebracteate above. Leaves 2 or 3, 8-12 x 0.7-2cm, close together, obong, oblong-elliptic to oblanceolate, acute to subacute, sessile, sheathing. Inflorescence densely many-flowered; flowers pendent, 2.5-3.5m across, uniformly green.

Voucher specimen: [Rajendra *et al*. 1667]; *Habitat*: Terrestrial; *Altitudinal ranges*: 2750–4200m; *Flowering*: June–August; *Date of collection*: 23 July 2011; *Present ecological status*: Sparse in habitat; *Local distribution within Darjeeling*: Kalpokhari, Bikhaybhanjang, Sandakphu, Phalut (Border area of

Nepal and India); Rachela forest – Kalimpong; *General distribution*: Nepal, N.E. India and China.

Herminium quinquelobum King & Pantling in J. Asiat. Soc. Bengal 65(2): 130. 1896. Plant 13-22cm tall; tuber 2x0.6cm, cylindric-fusiform. Stem slender, bractate above leaves; basal sheaths 2, overlapping. Leaves 2, 8-15x0.6-1.3cm, arising from within basal sheaths, linear-oblong, subacute. Inflorescence subdensely many-flowered. Flowers 0.3-0.4cm across, uniformly green.
Voucher specimen: [Rajendra *et al*. 1382]; *Habitat*: Terrestrial; *Altitudinal ranges*: 1800–2600m; *Flowering*: July–August; *Date of collection*: 30 July 2010; *Present ecological status*: Rare in habitat; *Local distribution within Darjeeling*: Rachela forest – Kalimpong; Manaybhanjang, Tonglu forest Border area of Nepal and India); *General distribution*: Nepal, N.E. India and China.

CONCLUSION

The species *Herminium* is purely terrestrial annual tuberous herb. It can be propagated by means of fleshy tubers. But disturbance of habitat cause greater harm to the survival of these species in the region. Regular habitat destruction by deforestation, rapid urbanization, over grazing, top layer soil erosion, frequent landslides, developmental projects, increase of agricultural lands, accumulation of pesticide and weedicide residual in the soil are the main reasons for habitat destruction. Therefore, conservation of natural habitat is most necessary in the region for the protection of terrestrial Orchid species including other vegetation.
But if effective steps are taken immediately for conservation, we can save Orchid species germplasm within a targeted time frame (Yonzone *et al*. 2012c).

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