Present Availability Status, Diversity Resources and Distribution of Medicinal Orchid species in Darjeeling Himalaya of West Bengal, India

Rajendra Yonzone¹*, D. Lama¹, R. B. Bhujel² and Samuel Rai³

¹Department of Botany, St. Joseph’s College, P.O. North Point, District Darjeeling, W. B., India
²Taxonomy and Ethnobiology Research Laboratory, Cluny Women’s College, District Darjeeling, W. B., India
³Darjeeling Krishi Vigyan Kendra, Uttar Banga Krishi Viswavidyalaya, District Darjeeling, W. B., India
*E-mail: ryonzone99@gmail.com

Abstract
Present paper deals with 48 medicinally important Orchid species from Darjeeling Himalaya of West Bengal with updated nomenclature, habitat, altitudinal ranges, flowering and fruiting, date of collection, voucher specimen, local distribution within Darjeeling Himalaya, geographical distribution and medicinal uses are mentioned in details.

Key words: Medicinal Orchid species, Present Status, Diversity, Distribution, Darjeeling Himalaya, India

Introduction
Orchids are considered to be the most highly evolved among the monocotyledons (Hajra and De, 2011). They exhibit incredible diversity in shape, size, structure, colour and fragrance of flowers (Kalita, 2006) and three different life forms víz. epiphytic, terrestrial and saprophytic and are pretty admired among the professional and amateur Orchid lovers of the world (Arora, 1985). Orchids are characterized by distinct floral morphology, pollination mechanism, association with unique fungal partners and miniscule seeds. In India, Orchids form 10% of the world Orchid flora with Himalayas as their natural home (Medhi and Chakrabarti, 2009) and the largest and commercially important flowering plants (Mulgaonkar and Dabhade, 2010). It is estimated that over 22,500 species with 779 genera are distributed throughout the world (Mabberly, 2008). Sir J. D. Hooker (1888-1890), described 1600 species from British India, Pradhan (1976, 1979) described a total of 810 species from the present India. Bose and Bhattacharjee (1980) listed 996 species under 162 genera from India. Subsequently, Jain and Mehrutra (1984) listed about 925 species under 144 genera; Kumar and Manilal (1994) reported 166 genera and 1141 species; Karthikeyan (2000) listed 1229 species under 184 genera. Singh et al. (2001) and Misra (2007) reported 1195

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species and 1331 species respectively from the present India. According to (Sathish Kumar and Manilal, 1994), there are about 1141 species of Orchids in India. In India, Orchids are found from the sea level to Alpine regions but their abundance varies in different regions according to prevailing climatic conditions. There are 1331 species belonging to 186 genera widely distributed throughout the country (Chowdhery, 2009). Of about 1,229 species of Orchids, distributed in tropical to Alpine regions of India (Chowdhery, 1999), 960 species are reported from Indian Himalayan region (Samant and Pant, 2006). As many as 545 Orchid species are reported from the Eastern Himalayan and 244 from the Trans, North West, and West Himalayan regions (Pangtey et al. 1991; Samant, 2002). Around 1,300 Orchid species have been estimated to occur in India; the Eastern Himalayas, the Western, and South Indian hills are the Orchid rich areas in the country (Bose et al. 1999). The East Himalayas and North-Eastern India; North-West Himalayas; Peninsular India; and Andaman and Nicobar Islands are the major Orchid rich regions in India (Vij, 1995).

Darjeeling Himalayan region is a rich repository of Orchid species. There are 109 genera with 392 Orchid species reported from Darjeeling district by many earlier workers viz., There are 90 genera with 283 species (Pearce and Cribb, 2002); 25 genera with 35 species (Hara Hiroshi, 1966); 13 genera with 20 species from (Hara Hiroshi, 1971), 16 genera with 26 species (Ohashi, Hiroyoshi, 1975), 29 genera with 62 species (Bruhl, 1926); 11 genera with 29 species (Pradhan, 1976), 56 genera with 212 species, (Pradhan, 1979), 44 genera with 87 species (Pradhan and Pradhan, 1997), 6 genera with 112 species (Hooker, 1888-1890); recently 85 genera with 311 species reported from Darjeeling Himalaya of India (Yonzone et al 2012a). Among them, 42 species are reported as medicinal orchids from the region. Of them 27 are epiphytic (Yonzone et al. 2011a) and the rest 15 are terrestrial (Yonzone et al. 2012b).

The medicinal importance of Orchids is known as early as 250-300 BC by Susruta and Vagbhata in ancient Sanskrit literature. Orchids in Sanskrit as ‘Vanda’ a name adopted for one of attractive and monopodial Orchids (Deb and Cribb, 2002). Orchids are used in the ancient Chinese medicines during 2800 BC. The term orchid was coined by Theophrastus and in Greek orchid literally means testicles. Tubers of various species of Orchis resemble the human testicles and was believed to be useful in treating human virility. Then Orchis gained widespread fame for its unique properties as aphrodisiac.

Some Orchid species reported to contain alkaloids, triterpenoids, flavonoids and stilbenoids. Ashtavarga is a group of 8 drugs in Ayurvedic formulation which are used for the preparation of tonics, such as ‘Chyavanapras’, which consists of 4 Orchid species, viz. Habenaria intermedia D. Don, (Riddhi), Habenaria edgeworthi Hook. f. (Vriddhi), Malaxis muscifera (Lindl.) Kuntze, (Jivaka) and Malaxis acuminata D. Don, (Rishbhaka). Besides these species, many orchid species are widely used as traditional medicines by people and used in pharmaceutical industries to isolate anthocyanins, stilbenoids and anthocyanins. Some of the phytochemicals like alkaloid, anthocyanins, arundinan, bibenzyl, cypripedin, dendrobine, gigantol, glucoside, glycoside, gymopusin, hircinol, jibantine, kinsenoside, loroglossin, nidemin and orchinol, phenanthrene, phenanthropyran, rotundatin and muscatin, stilbenoid, triterpenoid are reported from Orchids (Singh and Duggal, 2009). In India and other parts of the world use many Orchid species in their traditional system of herbal medicines. Present survey deals with 48 medicinal ly important Orchid species with their uses was carried out to find out the present availability status and distribution in the study area.

Study area
Darjeeling is the northernmost district of West Bengal, India. The district is subdivided into four Sub–Divisions viz., Darjeeling sadar; Kalimpong, Kurseong and Siliguri (Fig. 1). The region lies between 26°31’ and 27°31’ North latitude and between 87°59’ and 88°53’ East longitude in the Eastern Himalayan region of India. 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 Sub–Divisions form the hill areas whereas Siliguri Sub-Division is stationed at the foothill in a vast stretch of the plains.

The shape of the district is triangular. The total area of district is 3254.7 sq km which is 3.68 percent of the total areas of West Bengal state. The hilly region covers 2320 sq km and the remaining 934.7 sq km of the area falls in the Terai and plains. The altitudinal variations of the district range from 130 m at Siliguri to 3660 m at Sandakphu–Phalut with a sharp physiographic contrast between the plain and the mountainous regions. The climate of the region is conducive for growing of Orchids and it harbours numbers of Orchid species (Yonzone et al 2012a). In the present investigation, medicinal Orchid species with their uses was carried out to find out the present availability status and distribution in the study area.
Materials and Methods

Intensive field survey was conducted during the year 2007 – 2012 covering all the seasons of the year in the entire Darjeeling Himalaya and Sub-Himalaya regions including the forest areas, floral nurseries and farms covering all the altitudinal ranges as low as Siliguri ±130 m to as high as Sandakphu – Phalut 3660 m (Border area of Nepal and India) above the mean sea level. While working on Orchid flora of Darjeeling Himalayan region, medicinally important Orchid species were collected and recorded in the field note book. The specimens collected were processed into mounted herbarium-sheets following Jain and Rao (1977); and identified and authenticated with the help of Hooker (1888 – 1890); King and Pantling (1898); Pradhan (1979); Chowdhery (1998); Bose and Bhattacharjee (1999); Lucksom (2007); Pearce and Cribb (2002) and confirmed by matching at Central National Herbarium, Botanical Survey of India, (CAL). Orchids of medicinal values were find out after consulting literatures of Chowdhery, 1998, Dash et al. 2008, Deb et al. 2009, Medhi and Chakrabarty, 2009, Singh and Duggal, 2009, Sood et al. 2006 and Yonzone et al. 2011b. Finally, one set of Voucher specimens were deposited in the herbarium of Department of Botany, St. Joseph’s College, North Point, Darjeeling and at Taxonomy and Ethnobiology Research Laboratory, Cluny Women’s College, Kalimpong. Quadrats of 10 x 10 m for epiphytic species and 5 x 5 m for terrestrial were laid down to determine the present availability status of these species in the region. All the recorded species are enumerated alphabetically to their updated nomenclature, habitat, altitudinal range, specimen examined, date of collection and voucher specimen number, flowering and fruiting, present availability status, local distribution within Darjeeling Himalaya, geographical distribution and medicinal uses.

Enumeration

1. Acampe papillosa (Lindl.) Lindl., Fol. Orchid. Acampe 4:2, no.5. 1853. [Fig. 2]

Habitat: Epiphytic; Altitudinal range: 140–900 m; Specimen examined: Najoke forest 500m.

Date of collection and Voucher specimen number: 21 September 2008; Rajendra et al. 0709.

Flowering and Fruiting: October–March; Present availability status: Common.

Local distribution within Darjeeling Himalaya: Rambi, Relli, Sevoke, Najoke, Kalijhora forest, 27th mile, Mallik-Kalimpong, Sepkhol, Balasan, Birik forest.

Geographical distribution: India (North West Himalaya, Sikkim, West Bengal); Bangladesh, Bhutan, Laos, Myanmar, Nepal, Thailand and Vietnam.

Medicinal uses: Freshly collected roots are used by the inhabitants of Nagaland in rheumatism (Deb et al. 2009). The root paste is externally applied on scorpion and snake bites. Admixture of leaf paste and Garlic piece is taken in case stomach disorder caused by hyper acidity (Chowdhery, 1998; Sood et al. 2006; Yonzone et al. 2011b and Yonzone et al. 2012e).
2. Aerides multiflorum Roxb. Pl. Coromandel 3: 67, t.271. 1820. [Fig. 3]
Habitat: Epiphytic; Altitudinal range: 150–1200 m; Specimen examined: Samalbong 500 m.
Date of collection and Voucher specimen number: 20 April 2008; Rajendra et al. 0318.
Flowering and Fruiting: March–August; Present availability status: Rare.
Local distribution within Darjeeling Himalaya: Samalbong Busty, Suruk-Samthar, Siliguri, Mungpoo, Seokbir khani, Sittong.
Geographical distribution: India (North West Himalaya, Sikkim, West Bengal); Bangladesh, Bhutan, Laos, Myanmar, Thailand.
Medicinal uses: Whole plant juice is used to cure cuts and wounds (Sood et al. 2006; Singh and Duggal, 2009, Yonzone et al. 2011b).

3. Aerides odoratum Lour., Fl. Cochinch. 2: 525. 1790. [Fig. 4]
Habitat: Epiphytic; Altitudinal range: 150–700 m; Specimen examined: Bagrakot 500 m.
Date of collection and Voucher specimen number: 07 May 2009; Rajendra et al. 0844.
Flowering and Fruiting: May–September; Present availability status: Rare.
Local distribution within Darjeeling Himalaya: Bagrakot, Sukuna, Malli-Kalimpong, Solok-Kalimpong, Mungpoo, Lesh khola.
Geographical distribution: India (North West Himalaya, North East India, Sikkim, West Bengal); Bhutan, Borneo, Laos, Malaysia, Myanmar, Nepal, Philippines, Sumatra and Vietnam.
Medicinal uses: Roots and leaves paste mixed with leaf paste of Azadirachta indica and taken orally to reduce joint pain and swellings. The fresh leaf juice is taken orally to cure tuberculosis (Sood et al. 2006; Dash et al. 2008; Yonzone et al. 2011b).

Habitat: Terrestrial; Altitudinal range: 1000–1900 m; Specimen examined: Lava forest 2210 m.
Date of collection and Voucher specimen number: 28 June 2010; Rajendra et al. 1275.
Flowering and Fruiting: June–November; Present availability status: Rare.
Local distribution within Darjeeling Himalaya: Forest areas of Lava, Takdah, Rangayrung.
Geographical distribution: India, (Sikkim, West Bengal).
Medicinal uses: Fresh leaves paste used in case of snake bite (Sood et al. 2006 and Yonzone et al. 2011b).

5. Arundina graminifolia (D. Don) Hochr., in Bull. New York Bot. Gard. 6: 270 1910. [Fig. 5]
Habitat: Terrestrial; Altitudinal range: 300–1800 m; Specimen examined: Dello Hill 1460 m.
Date of collection and Voucher specimen number: 18 August 2007; Rajendra et al. 0094.
Flowering and Fruiting: January–November; Present availability status: Common.
Local distribution within Darjeeling Himalaya: Dello Hill, Sindeybong Busty, forest areas in Chui khim, Relli, Kumsi, Teesta River Valley, Yangmakum, Algarah, Mungpoo.

Geographical distribution: India (North West India, North East India, South India, Sikkim, West Bengal); Bangladesh, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Pacific Islands, South East Asia and Sri Lanka.

Medicinal uses: Rhizome paste is used to cure bacterial infected wounds (Sood et al. 2006; Singh and Duggal, 2009; Yonzone et al. 2011b), root decoction used in bodyache (Roy et al. 2007).

6. Calanthe sylvatica (Thour.) Lindl., Gen. Sp. Orchid. Pl.: 250. 1833. [Fig. 6]
Habitat: Terrestrial; Altitudinal range: 300–2400 m; Specimen examined: Kafer 1900 m.
Date of collection and Voucher specimen number: 09 August 2010; Rajendra et al. 1415.
Flowering and Fruiting: July–November; Present availability status: Rare.
Local distribution within Darjeeling Himalaya: Forest areas of Kafer, Algarah, Takdah, Chimney-Kurseong.
Geographical distribution: India (Sikkim); Bhutan.
Medicinal uses: Whole plant parts extensively used for epistaxis (Sood et al. 2006). Flowers used to stop nasal bleeding (Yonzone et al. 2012e).

7. Coelogyne fuscescens Lindl., Gen. Sp. Orchid. Pl.: 41. 1830. var. fuscescens [Fig. 7]
Habitat: Epiphytic; Altitudinal range: 700–2000 m; Specimen examined: Sangsay Bhalukhop 950 m.
Date of collection and Voucher specimen number: 31 October 2007; Rajendra et al. 0186.
Flowering and Fruiting: October – February; Present availability status: Common.
Local distribution within Darjeeling Himalaya: Samalbong, Sinjee, Kurseong, Nimbung, Damsang Gari, Todey forest, Nimbung, East Main Road.
Geographical distribution: India (North East India, West Bengal, Sikkim); Bhutan, Myanmar, Nepal, Thailand.
Medicinal uses: Pseudobulb paste administered orally for stomach ache (Roy et al. 2007).

8. Coelogyne corymbosa Lindl., Fol. Orchid. Coelogyne 5: 7, no. 16. 1854. [Fig. 8]
Habitat: Epiphytic; Altitudinal range: 1400–3300 m; Specimen examined: Rimbick 2100 m.
Date of collection and Voucher specimen number: 11 April 2008; Rajendra et al. 0308.
Flowering and Fruiting: April–July; Present availability status: Frequent.
Local distribution within Darjeeling Himalaya: Tiger Hill, Maneybhanjang, Samanden, Baggonra, Senchale.
Geographical distribution: India (North East India, Sikkim, West Bengal); Bhutan.
Medicinal uses: Juice of fresh pseudobulbs heals burn wounds (Roy et al. 2007).

9. Coelogyne ovalis Lindl. in Bot. Reg. 24: misc.91, no. 171. 1838. [Fig. 9]
Habitat: Epiphytic; Altitudinal range: 700–1900 m; Specimen examined: Suruk 600 m.
Suruk, Samalbong, Lopchu, Nimbung, Solok–Kalimpong, Chisang-Godok
Date of collection and Voucher specimen number: 24 October 2007; Rajendra et al. 0145.
Flowering and Fruiting: October–January; Present availability status: Sparse.
Local distribution within Darjeeling Himalaya: Samalbong Busty, Lopchu, Nimbing, Solok-Kalimpong, Chisang-Godok.
Geographical distribution: India (North East India, Sikkim, West Bengal); Java, Myanmar, Sumatra.
Medicinal uses: Whole plant parts is used in Western and Southern parts of India for the treatment of cough, urinary infection and eye disorders (Yonzone et al. 2012e).

10. Coelogyne punctulata Lindl. Coll. Bot.: sub t.33. 1821. [Fig. 10]
Habitat: Epiphytic; Altitudinal range: 1300–2200 m; Specimen examined: Damsang Gari 1800 m.
Date of collection and Voucher specimen number: 15 October 2010; Rajendra et al. 1496.
Flowering and Fruiting: October–February; Present availability status: Rare.
Local distribution within Darjeeling Himalaya: Damsang forest, Rimbick, Rambi forest, Nockdara, Lava.
Geographical distribution: India (North East India, Sikkim); China, Myanmar and Thailand.
Medicinal uses: Dried pseudobulbs are pounded into powder which is applied by the inhabitants of Nagaland to spots of burn injuries (Deb et al. 2009). It relieves pain immediately and helps in healing of the wound (Chowdhery, 1998; Sood et al. 2006).

Habitat: Epiphytic; Altitudinal range: 600–1300 m; Specimen examined: Nimbing 800 m.
Date of collection and Voucher specimen number: 05 March 2010; Rajendra et al. 1059.
Flowering and Fruiting: February–June; Present availability status: Rare.
Local distribution within Darjeeling Himalaya: Sittong, Nimbing, Mungpoo, Seokbir khani, Samthar Busty.
Geographical distribution: India (North East India, Sikkim, West Bengal); Bhutan.
Medicinal uses: Freshly collected pseudobulbs used to cure headache and fever (Sood et al. 2006; Yonzone et al. 2011b).

12. Cremastra appendiculata (D. Don) Makino in Bot. Mag. (Tokyo): 24 1904. [Fig. 12]
Habitat: Terrestrial; Altitudinal range: 1800–2400 m; Specimen examined: Tangta forest 2300 m.
Date of collection and Voucher specimen number: 11 May 2012; Rajendra et al. 1797.
Flowering and Fruiting: April–July; Present availability status: Rare.
Local distribution within Darjeeling Himalaya: Lava, Seri Khola, Manaybhanjang, Ramam, Gumbadara,
Geographical distribution: Nepal, India; Bhutan, China, Taiwan and Japan.
Medicinal uses: Paste of roots is used for toothache and as emollient. Tuber is used for abscesses, scrofula, freckles and is reported to use as an antidote to snake bite (Yonzone et al. 2012e).

13. Cymbidium aloifolium (L.) Sw., in Nova Acta Regiae Soc. Sci. Upsal. 6: 73. 1799. [Fig. 13]
**Habitat:** Epiphytic; **Altitudinal range:** 300–1600 m; **Specimen examined:** Relli below Bong Busty 700 m.

**Date of collection and Voucher specimen number:** 11 May 2008; Rajendra et al. 0362.

**Flowering and Fruiting:** April–September; **Present availability status:** Sparse.

**Local distribution within Darjeeling Himalaya:** Relli, Suruk, Kalimpong 7th Mile, Chitrey, Sangsay Bhalukhop, Seokbir khani, Tindharay, Durpin-Kalimpong, Pankhabari, Echey Busty.

**Geographical distribution:** India, Nepal, South China, Myanmar, Thailand, South East Asia, Malaysia and Java.

**Medicinal uses:** Fresh leaves are heated and the juice is dropped in the ear for the cure of otitis and other inflammatory conditions. Seeds are used for healing wounds and used by the inhabitants of Nagaland as haemostatic (Dash et al. 2008). Root powder is helpful to reduce paralysis. Entire plant is used as purgative, emetic, tonic and in treating earache. Mature seeds are used for healing wounds (Chowdhery 1998; Sood et al. 2006; Medhi and Chakrabarty, 2009 and Yonzone et al. 2011b).

14. **Cymbidium iridioides** D. Don, Prodr. Fl. Nepal.: 36. 1825. [Fig. 14]

**Habitat:** Epiphytic; **Altitudinal range:** 1100–2400 m; **Specimen examined:** Neora Valley 2400 m.

**Date of collection and Voucher specimen number:** 24 November 2011; Rajendra et al. 1745.

**Flowering and Fruiting:** October–January; **Present availability status:** Frequent.

**Local distribution within Darjeeling Himalaya:** Algarah, Lava, Neora Valley, Chimney-Kurseong, Baggora, Takdah.

**Geographical distribution:** India (North East India, Sikkim, West Bengal); Myanmar, Nepal, South West China.

**Medicinal uses:** Fresh leaf juice is used for clotting of blood in wound (Medhi and Chakrabarty, 2009; Yonzone et al. 2011).


**Habitat:** Epiphytic; **Altitudinal range:** 1700–2300 m; **Specimen examined:** Gumbadara 2100 m.

**Date of collection and Voucher specimen number:** 23 October 2008; Rajendra et al. 0724.

**Flowering and Fruiting:** October–February; **Present availability status:** Rare.

**Local distribution within Darjeeling Himalaya:** Lava, Gumbadara, Algarah, Kafer forest, Gumbadara, Takdah.

**Geographical distribution:** India, (North East India, Sikkim, West Bengal), Myanmar, Nepal, South West China.

**Medicinal uses:** Fresh roots decoction is effectively used for nervous disorders, madness, epilepsy, hysteria, rheumatism, spasms (Sood et al. 2006; Yonzone et al. 2011b). Salep used as demulcent. Aqueous solution of dried and powdered pseudobulbs is taken orally in empty stomach condition as emetic (Roy et al. 2007).

16. **Dendrobium amoenum** Wall. ex Lindl., Gen. Sp. Orchid. Pl.: 78. 1830. [Fig. 15]

**Habitat:** Epiphytic; **Altitudinal range:** 300–800 m; **Specimen examined:** Suruk 600 m.

**Date of collection and Voucher specimen number:** 12 May 2008; Rajendra et al. 0376.

**Flowering and Fruiting:** May–September; **Present availability status:** Sparse.
Local distribution within Darjeeling Himalaya: Suruk, Samalbong, Jaldhaka, Lesh k sola, Reyang.
Geographical distribution: India (Sikkim, West Bengal); Bhutan, Nepal.
Medicinal uses: Fresh shoots extraction serves as antibiotic and inhibits the growth of bacteria in wounds and ulcers (Sood et al. 2006; Yonzone et al. 2011).

17. Dendrobium chrysanthum Wall. ex Lindl., in Bot. Reg. 15: t.1299. 1830; Gen. Sp. Orchid. Pl.: 80 1830. [Fig. 16]
Habitat: Epiphytic; Altitudinal range: 800–2200m Specimen examined: Algarah 1700 m.
Date of collection and Voucher specimen number: 06 September 2008; Rajendra et al. 0687.
Flowering and Fruiting: July–November; Present availability status: Frequent.
Local distribution within Darjeeling Himalaya: Algarah, Lava, Nokdara, Lungsel, Todey, Damsang forest, Lopchu, Takdah, Sonada, Rambi forest, Baggonra.
Geographical distribution: India (Sikkim, West Bengal); Bhutan, China, Laos, Myanmar, Nepal, Thailand and Vietnam.
Medicinal uses: Powdery seeds dried and used by the inhabitants of Nagaland as haemostatic (Deb et al. 2009; Yonzone et al. 2011b).

18. Dendrobium chrysotoxum Lindl., in Bot. reg. 33: sub t. 19, t.36. 1847. [Fig. 17]
Habitat: Epiphytic; Altitudinal range: 1300–1800 m; Specimen examined: Holumba Floral Nursery – Kalimpong 900 m.
Date of collection and Voucher specimen number: 26 May 2011; Rajendra et al. 1613.
Flowering and Fruiting: May–August; Present availability status: Planted.
Local distribution within Darjeeling Himalaya: Holumba Floral Nursery – Kalimpong.
Geographical distribution: India (Nagaland, Manipur, Mizoram); Cambodia, Java, Laos, Myanmar and Vietnam.
Medicinal uses: Whole plant extract serves as antitumorous and anticancerous (Sood et al. 2006); powdery seeds dried and used by the inhabitants of Nagaland as haemostatic (Deb et al. 2009).

19. Dendrobium densiflorum Lindl., Gen. Sp. Orchid. Pl.: 90. 1830. [Fig. 18]
Habitat: Epiphytic; Altitudinal range: 300–2100 m. Specimen examined: Suruk 800 m.
Date of collection and Voucher specimen number: 24 April 2008; Rajendra et al. 0331.
Flowering and Fruiting: April–August; Present availability status: Sparse
Local distribution within Darjeeling Himalaya: Suruk, Najoke, Relli, Seokbir khani, Lopchu, Mungpoo, Pedong, East Man Road.
Geographical distribution: India (North East India, West Bengal, Sikkim); Bhutan, Myanmar, Nepal and China.
Medicinal uses: Fresh leaf poultice recommended for bone fracture and stem bark used as ear-ring (Sood et al. 2006); powdery seeds dried and used by the inhabitants of Nagaland as haemostatic (Deb et al. 2009).
20. **Dendrobium denudans** D. Don, Prodr. Fl. Nepal.: 34. 1825. [Fig. 19]

**Habitat:** Epiphytic; **Altitudinal range:** 600–1800; **Species examined:** Mangzing 500 m.

**Date of collection and Voucher specimen number:** 18 September 2007; Rajendra *et al.* 0109.

**Flowering and Fruiting:** September–December; **Present availability status:** Frequent.

**Local distribution within Darjeeling Himalaya:** Mangzing, Nimbong, Samalbong, Durpin-Kalimpong, Solok-Kalimpong, Rungdung Valley.

**Geographical distribution:** India (North East India, Sikkim, West Bengal); Bhutan and Nepal.

**Medicinal uses:** Folklore medicine; raw stem eaten to immediately relieve a person of high fever and body aches and to prepare narcotic drug (Mao, 2006).

![Fig. 17. Dendrobium chrysotoxum Lindl.](image1)
![Fig. 18. Dendrobium densiflorum Lindl.](image2)
![Fig. 19. Dendrobium denudans D. Don](image3)

21. **Dendrobium fimbriatum** Hook., Exot. Fl. 1: t.71. 1823. [Fig. 20]

**Habitat:** Epiphytic; **Altitudinal range:** 600–1660 m; **Species examined:** Kumsi 650 m.

**Date of collection and Voucher specimen number:** 27 April 2011; Rajendra *et al.* 1579.

**Flowering and Fruiting:** April–July; **Present availability status:** Sparse.

**Local distribution within Darjeeling Himalaya:** Kumsi forest, Algarah – Kalimpong, Chisang-Godok, Bong Busty, Mungpoo, Pudung, Nimbong.

**Geographical distribution:** India (Meghalaya); Myanmar, Nepal and Thailand.

**Medicinal uses:** Decoction of flowers and leaves are used for liver upsets and nerves debility. Poultice of fresh leaves used to cure boils and pimples. Fresh leaves and flowers used to cure cholera (Medhi and Chakrabarty. 2009; Yonzone *et al.* 2011).

22. **Dendrobium jenkinsii** Wall. ex Lindl., in Bot. Reg. 25: t.37. 1839. [Fig. 21]

**Habitat:** Epiphytic; **Altitudinal range:** 1100–1400 m; **Species examined:** Holumba Floral Nursery 900 m.

**Date of collection and Voucher specimen number:** 26 April 2011; Rajendra *et al.* 1574.

**Flowering and Fruiting:** April–July; **Present availability status:** Planted.

**Local distribution within Darjeeling Himalaya:** National Research Centre for Orchids, Indian Council for Agricultural Research, Darjeeling Campus, Holumba Floral Nursery – Kalimpong.

**Geographical distribution:** India (North East India, Sikkim, West Bengal); Bhutan, China, North Laos, Myanmar, North Thailand.

**Medicinal uses:** Whole plant parts used to treat nerves, cholera, pimples and boils (Sood, 2006; Yonzone *et al.* 2011).

23. **Dendrobium moschatum** (Buch.-Ham.) Sw., in Schrader, Neu. J. Bot. 1: 94. 1806. [Fig. 22]

**Habitat:** Epiphytic and Lithophytic; **Altitudinal range:** 500–1300 m; **Species examined:** Relli – Pala 800 m.

**Date of collection and Voucher specimen number:** 21 June 2007; Rajendra *et al.* 0061.

**Flowering and Fruiting:** May–August; **Present availability status:** Sparse.
Local distribution within Darjeeling Himalaya: Relli, Toonang forest, Chisang-Godok, Samsing, Saml burg, Mungpoo, Latpanjar, Rangit Valley.

Geographical distribution: India (Assam, Meghalaya, Sikkim); Bhutan, Cambodia, Java, Laos, Malaya, Myanmar, Nepal, Thailand and Vietnam.

Medicinal uses: Fresh leaf juice is used in Meghalaya for earache. Powdery seeds dried and used by the inhabitants of Nagaland as haemostatic (Sood et al. 2006; Medhi and Chakrabarty, 2009; Deb et al. 2009; Yonzone et al. 2011).

24. Dendrobium nobile Lindl., Gen. Sp. Orchid. Pl.: 24. 1830. [Fig. 23]

Habitat: Epiphytic and Lithophytic; Altitudinal range: 300–2200 m; Specimen examined: Rimbick 2200 m.
Date of collection and Voucher specimen number: 27 May 2008; Rajendra et al. 0421.

Flowering and Fruiting: April–September; Present availability status: Sparse.

Local distribution within Darjeeling Himalaya: Relli, 8th Mile Kalimpong, Rimbick forest, Sangsay Bhalukhop, Toonang forest, East Man Road, Echey.

Geographical distribution: India (West Bengal, Assam, Meghalaya); Bhutan, China, Myanmar, Nepal and Thailand.

Medicinal uses: Whole plant parts is used in the treatment of pulmonary tuberculosis, flatulence, general debility, cut and wounds healing, dyspepsia, night sweats, fever and anorexia. It is antiphlogistic, pectoral, stomachic and tonic (Chowdhery, 1998; Sood et al. 2006; Medhi and Chakrabarty, 2009; Singh and Duggal, 2009); powdery seeds and root-powder used to heal wounds; also used by the inhabitants of Nagaland in case of nervous disorder (Deb et al. 2009; Yonzone et al. 2011b), pseudobulb extract used to cure eye infections and to soothe burns (Roy et al. 2007).

25. Eria bambusifolia Lindl., in J. Proc. Linn. Soc., Bot. 3: 61. 1859. [Fig. 24]

Habitat: Epiphytic; Altitudinal range: 1900–2800 m; Specimen examined: Todey 1400 m.
Date of collection and Voucher specimen number: 20 May 2008; Rajendra et al. 0405.

Flowering and Fruiting: October–February; Present availability status: Rare.

Local distribution within Darjeeling Himalaya: Sukiapokhari, Godok-Todey, Rambi forest, Tangta.

Geographical distribution: India (West Bengal, Meghalaya, Mizoram, Nagaland, Orissa); China, Thailand.

Medicinal uses: Mixture prepared from whole plant parts and ripe fruits of Aegle marmelos is used to cure hyper acidity and stomach disorder (Dash et al. 2008).

26. Eria pannea Lindl., in Bot. Reg. 28: misc.64, no.79. 1842. [Fig. 25]

Habitat: Epiphytic; Altitudinal range: 600–1000 m; Specimen examined: Kambal 500 m.
Date of collection and Voucher specimen number: 10 May 2011; Rajendra et al. 1592.

Flowering and Fruiting: May–September; Present availability status: Rare.
Local distribution within Darjeeling Himalaya: Kumsi forest, Kambal, Chisang-Godok

Geographical distribution: India (North East India, Sikkim, West Bengal); Bhutan, Borneo, China, Malaysia, Myanmar, South East Asia and Sumatra.

Medicinal uses: Decoction prepared from fresh roots and leaves are useful in boneache. Whole plants is used in bath for ague (Chowdhery, 1998; Medhi and Chakrabarty, 2009; Yonzone et al. 2011b).


Habitat: Terrestrial; Altitudinal range: 600–1100 m; Specimen examined: Kumsi 750 m.
Date of collection and Voucher specimen number: 01 May 2009; Rajendra et al. 0839.
Flowering and Fruiting: April–July; Present availability status: Sparse.
Local distribution within Darjeeling Himalaya: Forest areas of Kumsi, Sittong, Chisang-Godok
Geographical distribution: India (Sikkim, West Bengal); Bhutan, China, Island, Indo-China, Malaysia, New Guinea, Philippines, Sri Lanka, Tunga.
Medicinal uses: Tubers are used against aphrodisiac and leaf decoction is used against vermifuge (Dash et al. 2008; Yonzone et al. 2011).

28. Geodorum densiflorum (Lamk.) Schltr., in Feddes Repert. Sp. Nov. Regni Veg. Beih. 4: 259. 1919. [Fig. 27]

Habitat: Terrestrial; Altitudinal range: 300–1300 m; Specimen examined: Relli River sides 500 m.
Date of collection and Voucher specimen number: 21 June 2008; Rajendra et al. 0503.
Flowering and Fruiting: June–September; Present availability status: Rare.
Local distribution within Darjeeling Himalaya: Relli River sides, Pudung-Sendaybong, Sittong, Bong Busty.
Geographical distribution: India (Sikkim, West Bengal), Malaysia, Philippines, Ryukyu Islands the South East Asia, Taiwan.
Medicinal uses: fresh root paste mixed with honey and taken orally to regularize menstrual cycle in women (Dash et al. 2008).

29. Gymnadenia orchidis Lindl. var. orchidis Gen. Sp. Orchid. Pl.: 278. 1835. [Fig. 26]
Habitat: Terrestrial; Altitudinal range: 3000–4300m; Specimen examined: Sandakphu 3500 m.
Date of collection and Voucher specimen number: 08 July 2008; Rajendra et al. 0546.
Flowering and Fruiting: June–October; Present availability status: Threatened.
Local distribution within Darjeeling Himalaya: Sandakphu, Phalut forest.
Geographical distribution: India (North East India, Sikkim, West Bengal); Bhutan, China and Nepal.
Medicinal uses: Whole plant is beneficial in gastric, gonadic and urine disorders (Rawat and Pangtey, 1987).
Fig. 26. *Gymnadenia orchidis* Lindl. 1. Habit (whole plant with mature inflorescence); 2. Side view of flower with floral bract and spur; 3. Front view of flower; 4. Lip with spur; 5. Floral perigone, a. dorsal sepal, b. lateral sepal, c. petals and d. lip; 6. Front view of column apex (a) anther cell, (b) pollinia inside anther cell, (c) staminode and (d) stigma; 7. Anther; 8. Pollinia.

30. *Habenaria dentata* (Sw.) Schltr., in Feddes Repert. Spec. Nov. Regni Veg. Beih. 4: 125. 1919. [Fig. 28]

**Habitat:** Terrestrial; **Altitudinal range:** 600–1600 m; **Specimen examined:** Algarah 1800 m.

**Date of collection and Voucher specimen number:** 09 October 2008; Rajendra *et al.* 0713.

**Flowering and Fruiting:** September–November; **Present availability status:** Rare.

**Local distribution within Darjeeling Himalaya:** Forest areas of Algarah, Soureni, Mungpoo, Samalbong, 15th Mile-Kalimpong.

**Geographical distribution:** India (North East India, West Bengal); Bhutan, Cambodia, China, Japan, Laos, Malaysia, Myanmar, Nepal, Philippines, Taiwan, Thailand, Vietnam.

**Medicinal uses:** Whole plant is useful as an analgesic, disinfectant, aphrodisiac, antirheumatic, urinary trouble and orthopedic ailments (Sood *et al.* 2006).

31. *Habenaria pectinata* (J.E. Sm.) D. Don, Prodr. Fl. Nepal: 24. 1825. [Fig. 30]

**Habitat:** Terrestrial; **Altitudinal range:** 1500–2400 m; **Specimen examined:** Dhotray 2300 m.

**Date of collection and Voucher specimen number:** 11 August 2008; Rajendra *et al.* 0647.

**Flowering and Fruiting:** August–October; **Present availability status:** Rare.

**Local distribution within Darjeeling Himalaya:** Dhotray, Manaybhanjang, Ramam, Pattabong, Damsang forest.

**Geographical distribution:** Nepal (North East India, North West Himalaya, Sikkim); China, Nepal.

**Medicinal uses:** Fresh leaves are crushed and applied in snake bites. Tubers mixed with condiments are used in arthritis rheumatism. Roots used as blood purifier, also used to increase sexual power in males (Singh and Duggal, 2009; Yonzone *et al.* 2011b).
Fig. 30. *Habenaria pectinata* (J.E. Smith) D. Don, 1. Habit (whole plant with inflorescence); 2. Flower; 3. Petals; 4. Pedicellate ovary, spur, lip and column showing (a) anther, (st) staminode, (s) stigma, (o) orifice of spur, (at) anther tube and (pg) gland of pollinia; 5. Pollinia.

32. *Liparis odorata* (Willd.) Lindl., *Gen. Sp. Orchid. Pl.*: 26. 1830. [Fig. 29]

**Habitat:** Terrestrial; **Altitudinal range:** 800–1900 m; **Specimen examined:** Kafer 1500 m.

**Date of collection and Voucher specimen number:** 01 August 2008; Rajendra et al. 0587.

**Flowering and Fruiting:** July–October; **Present availability status:** Frequent.

**Local distribution within Darjeeling Himalaya:** Dello Hill (Kalimpong), Kafer, Durpin-Kalimpong, Tunsong, Sonada-Pacheng, Munson, Today.

**Geographical distribution:** India (Sikkim, West Bengal); Bhutan, China, Laos, Myanmar, Nepal, Taiwan, Thailand and Vietnam.

**Medicinal uses:** Fresh leaf juice used in burns, cancerous ulcers and gangrene (Sood *et al.* 2006; Singh and Duggal, 2009).

Fig. 27. *Geodorum densiflorum* (Lamk.) Schltr.


**Habitat:** Epiphytic; **Altitudinal range:** 800–1300 m; **Specimen examined:** Nimbong 1100 m.

**Date of collection and Voucher specimen number:** 22 March 2009; Rajendra et al. 0791.

**Flowering and Fruiting:** March–June; **Present availability status:** Sparse.

**Local distribution within Darjeeling Himalaya:** Kumsi, Mungpoo, Samalbong, Nimbong, Seokbir khani, Pudung-Sendaybong Busty.

**Geographical distribution:** India (North East India, Sikkim, West Bengal), Bhutan, Myanmar and Thailand.

**Medicinal uses:** Root paste mixed with turmeric and ginger and intake orally to cure jaundice. The root extract is used as anti-diarrhoea and to reduce muscular pains in humans (Sood *et al.* 2006; Dash *et al.* 2008; Yonzone *et al.* 2011b).

34. *Malaxis acuminata* D. Don, *Prodr. Fl. Nepal.*: 29. 1825. [Fig. 34]

**Habitat:** Terrestrial; **Altitudinal range:** 800–2100 m; **Specimen examined:** Kumsi forest 800 m.

**Date of collection and Voucher specimen number:** 25 July 2008; Rajendra *et al.* 1664,

**Flowering and Fruiting:** January–August; **Present availability status:** Sparse.

**Local distribution within Darjeeling Himalaya:** Dello Hill, forest areas of Lava, Takdah, Algarah, Lopchu, Birch Hill, Durpin, Tungsong.

**Geographical distribution:** India (North and North East India, Sikkim, West Bengal); Bhutan, China, Java, Malaysia, Myanmar, Nepal, Philippines, Thailand and Vietnam.
Medicinal uses: Decoction prepared from the pseudobulb is used by the inhabitants of Nagaland to cure fever, tuberculosis (Deb et al. 2009), burning sensation, bleeding diathesis, phthisis, cooling, febrifuge and spermopiotic (Chowdhery, 1998; Sood et al. 2006; Singh and Duggal, 2009).

35. Malaxis muscifera (Lindl.) Kuntze, Revis. Gen. Pl. 2: 673. 1891. [Fig. 35]
Habitat: Terrestrial; Altitudinal range: 2000–2900 m; Specimen examined: Gairibas 2800 m.
Date of collection and Voucher specimen number: 07 August 2008; Rajendra et al. 0633.
Flowering and Fruiting: July–October; Present availability status: Frequent.
Local distribution within Darjeeling Himalaya: Forest areas of Gairebas, Gurasay, Kalpokhari, Birch Hill, Dhotray, Rachela, Bikhaybhajang, Lamaydhura, Senchale, Tonglu, Sandakphu, Phalut, Jaunbari, Tiger Hill.
Geographical distribution: India (Himachal Pradesh, Kashmir, Uttaranchal, Uttar Pradesh, Sikkim, West Bengal); Bhutan, Nepal.
Medicinal uses: Decoction prepared from the fresh pseudobulbs used to treat fever, burning sensation, bleeding diathesis phthisis and as aphrodisiac. It is cooling, febrifuge and spermopiotic (Sood et al. 2006; Singh and Duggal, 2009).

36. Nervilia aragoana Gaud. in Freycinet, Voy. Uranie: 422, t.35. 1826. [Fig. 31]
Habitat: Terrestrial; Altitudinal range: 300–1000 m; Specimen examined: Latpanjar forest 800 m.
Date of collection and Voucher specimen number: 24 April 2011; Rajendra et al. 1568.
Flowering and Fruiting: April–June; Present availability status: Sparse.
Local distribution within Darjeeling Himalaya: Kalijhora, 27th mile, Sittong, Geilkhola, Lathpanjar.
Geographical distribution: India (Sikkim, West Bengal); Australia, China; Indonesia, Malaysia, Philippines, Samoa, Palau, New Guinea, South East Asia and Timor.
Medicinal uses: Entire plant parts are used in the preparation of Ayurvedic drugs. The decoction prepared from the fresh leaves is used as a protective medicine after childbirth in Malaysia (Sood et al. 2006).

37. Nervilia plicata (Andr.) Schltr., in Bot. Jahrb. Syst. 45: 403. 1911. [Fig. 32]
Habitat: Terrestrial; Altitudinal range: 300–800 m; Specimen examined: Kalijhora 550 m.
Date of collection and Voucher specimen number: 13 May 2011; Rajendra et al. 1598.
Flowering and Fruiting: May–July; Present availability status: Sparse.
Local distribution within Darjeeling Himalaya: Teesta River Valley, Pareng, Rongo, Kalijhora.

Geographical distribution: India (North and North East India, Sikkim, West Bengal); Australia, Malay-Archipelago, Laos, Malaysia, Myanmar, Philippines, S. China, Thailand and Vietnam.

Medicinal uses: Whole plant parts decoction is effective against cough, urinary trouble, diarrhoea, asthma (Sood et al. 2006).


38. Oberonia caulescens Lindl., Fol. Orchid. Oberonia 2: 7, no.39. 1859. [Fig. 33]

Habitat: Epiphytic; Altitudinal range: 1500–2700 m. Specimen examined: Damsang forest 1900 m.

Date of collection and Voucher specimen number: 18 July 2011; Rajendra et al. 1656.

Flowering and Fruiting: June–September; Present availability status: Rare.

Local distribution within Darjeeling Himalaya: Forest areas in Damsang Gari, Lava – Kalimpong, Sureil, Dhotrey.

Geographical distribution: India (Sikkim, West Bengal); Bengal and Nepal.

Medicinal uses: Tubers are useful to treat liver diseases (Sood et al. 2006).

Fig. 33. Oberonia caulescens Lindl. 1. Habit (whole plant with inflorescence); 2. Front view of flower; 3. Anther; 4. Pollinia.
39. *Paphiopedilum insigne* (Wall. ex Lindl.) Pfitz. Morph. Stud. Orchideenbl. 11. 1886. [Fig. 36]

**Habitat:** Terrestrial; **Altitudinal range:** 900–1100m; **Specimen examined:** Pine View floral Nursery 1100m.

**Flowering and Fruiting:** November–January; **Present availability status:** Planted.

**Date of collection and Voucher specimen number:** 16. 12. 2010; Rajendra et al. 1529.

**Local distribution within Darjeeling Himalaya:** Holumba Floral Nursery, National Research Centre for Orchids, Indian Council of Agricultural Research, Darjeeling, Lloyd Botanical Garden.

**Geographical distribution:** India (Meghalaya).

**Medicinal uses:** Whole plant used against amoebic dysentery (Roy et al. 2007).

40. *Papilionanthe teres* (Roxb.) Schltr., in Orchis 9: 78, t.12. 1915. [Fig. 37]

**Habitat:** Epiphytic; **Altitudinal range:** 150–700 m; **Specimen examined:** North Bengal University Campus 180 m.

**Date of collection and Voucher specimen number:** 16 June 2008; Rajendra et al. 0491.

**Flowering and Fruiting:** May–August; **Present availability status:** Sparse.

**Local distribution within Darjeeling Himalaya:** Sevoke, North Bengal University Campus, Najoke, Kumai, Matigara, Khaprail, Gulma forest, Sukuna, Balasan.

**Geographical distribution:** India (North East India, Sikkim, West Bengal); Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam.

**Medicinal uses:** Leaf paste is applied during high fever. Roots decoction used as an antifertility medicine and leaves decoction used to cure typhoid fever (Sood et al. 2006; Medhi and Chakrabarty, 2009).

41. *Phaius tankervilleae* (Banks ex l’Herit.) Bl., Mus. Bot. 2: 177. 1856. [Fig. 38]

**Habitat:** Terrestrial; **Altitudinal range:** 500–1800 m; **Specimen examined:** Pudung Busty 800 m.

**Date of collection and Voucher specimen number:** 10 April 2009; Rajendra et al. 0811.

**Flowering and Fruiting:** April–June; **Present availability status:** Planted.

**Local distribution within Darjeeling Himalaya:** Samalbong, Sinjee, Printham, Pudung, Pedong, Kurseong, Mirik, Seokbir khani, Sittong, Algarah, Lolay-Pala Busty.

**Geographical distribution:** India (Sikkim, West Bengal); Australia, Bhutan, China, Indonesia, Japan, Malaysia, Myanmar, New Guinea, Pacific Islands and Sri Lanka.

**Medicinal uses:** Fresh pseudobulbs are used for bone fracture and dysentery. Pounded pseudobulbs, roots and leaves are used as poultices for boils, infested wounds and abscesses (Chowdhery, 1998; Medhi and Chakrabarty, 2009); paste of whole plant along with wild ginger is used as medicine in dysentery and to heal bone fractures (Roy et al. 2007).

42. *Pholidota articulata* Lindl., Gen. Sp. Orchid. Pl.: 38. 1830. [Fig. 39]

**Habitat:** Epiphytic; **Altitudinal range:** 300–1600 m; **Specimen examined:** Samalbong Busty 1000 m.
Date of collection and Voucher specimen number: 20 May 2008; Rajendra Yonzone et al. 0393.
Flowering and Fruiting: April–August; Present availability status: Frequent.
Local distribution within Darjeeling Himalaya: Samalbong, Kalijhora, Seokbir khani, Rungdung Valley, Godok, Ryang, Guling forest, Toonang, Nimbong, East Man Road-Kalimpong.
Geographical distribution: India (North East India, Sikkim, West Bengal); Bhutan, Borneo, Cambodia, Java, Myanmar, Nepal, Sumatra, Thailand, Vietnam.
Medicinal uses: Entire plant parts is considered as a tonic (Sood et al. 2006).

43. Pholidota imbricata Hook., Exot. Fl. 2: t.138. 1825. [Fig. 40]
Habitat: Epiphytic; Altitudinal range: 300–1200 m; Specimen examined: Samalbong Busty 1000 m.
Date of collection and Voucher specimen number: 14 June 2008; Rajendra et al. 0487.
Flowering and Fruiting: April–August; Present availability status: Frequent.
Local distribution within Darjeeling Himalaya: Samalbong-Relli, Kalijhora, 27th mile N.H.P.C. project sides, Lohapul, Bong Busty, Mangmaya.
Geographical distribution: India (North East India, Sikkim, West Bengal); Australia, Bangladesh, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Philippines, South West Pacific Islands, Thailand, Vietnam.
Medicinal uses: Pseudobulbs paste used as poultice for finger abscess and rheumatism (Sood et al. 2006); plant decoction used by the inhabitants of Nagaland to cure skin rash (Deb et al. 2009), pseudobulb extract used to cure abdominal pain and rheumatism (Roy et al. 2007).

44. Pholidota pallida Lindl., in Bot. Reg. 21: sub t.1777. 1835. [Fig. 41]
Habitat: Epiphytic; Altitudinal range: 800–1100 m; Specimen examined: Samalbong 900 m.
Date of collection and Voucher specimen number: 07 July 2010; Rajendra et al. 1301.
Flowering and Fruiting: June–November; Present availability status: Sparse.
Local distribution within Darjeeling Himalaya: Samalbong, Relli, Kalijhora, Lathpanjar, Sittong, Rungdung Valley, Sinjee Busty.
Medicinal uses: Pseudobulbs crushed and mixed with mustard oil are used in curing rheumatic pains (Chowdhery, 1998).

45. Pleione maculata (Lindl.) Lindl., in Paxton’s Fl. Gard. 2: 5, t.39. 1851. [Fig. 42]
Habitat: Epiphytic; Altitudinal range: 500–1800m; Specimen examined: Pankhabari 500 m.
Date of collection and Voucher specimen number: 18 October 2010; Rajendra et al. 1504.
Flowering and Fruiting: October–December; Present availability status: Threatened.
Local distribution within Darjeeling Himalaya: Pankhasari forest, Mirik, Mungpoo, Rangayrung, Munsong.
**Geographical distribution:** India (North East India, Sikkim, West Bengal); Bhutan, South West China, Thailand.

**Medicinal uses:** Fresh rhizome is useful for cure of liver complaints (Sood *et al.* 2006; Yonzone *et al.* 2011b).

46. *Rhynchostylis retusa* (L.) Bl., Bijdr.: 286, T.49. 1825. [Fig. 43]

**Habitat:** Epiphytic; **Altitudinal range:** 150–900m; **Specimen examined:** Samalbong Busty 900 m.

**Date of collection and Voucher specimen number:** 22 June 2008; Rajendra *et al.* 0519.

**Flowering and Fruiting:** June–September; **Present availability status:** Frequent.

**Local distribution within Darjeeling Himalaya:** Samalbong, Sevoke, Bagrakot, Jaldhaka, Sittong, Mungpong, Kumsi, Latpanjar, Balasan, Sinjee, Gasoke Busty.

**Geographical distribution:** India (North East India, Sikkim, West Bengal); China, Bhutan, Java, Malaya, Myanmar, Nepal, Philippines, Sumatra and Thailand.

**Medicinal uses:** Root paste is used to cure blood dysentery and wounds. Plant is emollient and poultice of leaves used to treat rheumatic ailment (Chowdhery, 1998; Sood *et al.* 2006) and Dash *et al.* 2008), leaf juice used externally by the inhabitants of Nagaland on skin as emollient (Deb *et al.* 2009) paste of whole plant is applied on the body against various skin diseases (Roy *et al.* 2007).

47. *Satyrium nepalense* D. Don, var. *nepalense* Prodr. Fl. Nepal: 26. 1825. [Fig. 44]

**Habitat:** Terrestrial; **Altitudinal range:** 1700–3500m; **Specimen examined:** Sandakphu 3400 m.

**Date of collection and Voucher specimen number:** 11 August 2008; Rajendra *et al.* 1411.

**Flowering and Fruiting:** August–November; **Present availability status:** Rare.

**Local distribution within Darjeeling Himalaya:** Maneybhanjang, Lava, Algarah, Chitrey, Dhotrey, Rambi forest, Senchale, Serikhola.

**Geographical distribution:** India (Sikkim, West Bengal); Bhutan, Myanmar, Sri Lanka.

**Medicinal uses:** Tubers are used as tonic and to cure dysentery and malaria fever (Chowdhery, 1998; Medhi and Chakrabarty, 2009). The fresh tubers are cooked and consumed, dried ones sold as ‘salammisri’ and regarded as tonic; these are also reported to be useful in malaria and dysentery (Pathak *et al.*, 2010). It is also used as a food, tonic, in diarrhoea, malaria and dysentery (Saklani *et al.*, 2011).

48. *Vanda cristata* Lindl., Gen. Sp. Orchid. Pl.: 216. 1833. [Fig. 45]

**Habitat:** Epiphytic; **Altitudinal range:** 700–1900m; **Specimen examined:** Todey 1300 m.

**Date of collection and Voucher specimen number:** 27 May 2008; Rajendra *et al.* 0434.

**Flowering and Fruiting:** April–August; **Present availability status:** Common.

**Local distribution within Darjeeling Himalaya:** Lungshel, Samalbong, Sinjee, Mangmaya, Seokbir khani, Mirik, Sendaybong, Mangmaya, Munsong, Todey.
**Geographical distribution:** India (North East India, Sikkim, West Bengal); Bhutan and Nepal.

**Medicinal uses:** Fresh leaves are used as an energizing tonic and expectorant (Sood et al. 2006; Medhi and Chakrabarty, 2009 and Yonzone et al. 2011).

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**Results and Discussion**

After periodic field survey and the relevant literature survey, 27 genera with 48 number of Orchid species were found in the regions as medicinally important and their medicinal usage are known worldwide, especially in indigenous herbal medicine and the pharmaceutical industries but none of the species is found to be used as a medicine in the study regions till today. Of these, 31 species are epiphytic and the rest 17 are terrestrial. The number of epiphytic is greater than the terrestrial. Among 27 genera, 13 are epiphytic and the rest 14 are terrestrial and 2 Aerides spp., 5 Coelogyne spp., 3 Cymbidium spp., 9 Dendrobium spp., 2 Eria spp., 3 Pholidota spp., 2 Habenaria spp., 2 Malaxis spp., 2 Nervilia spp and the rest genera possess single species are medicinally important. Two Dendrobium species like *D. moschatum* (Buch.-Ham.) Sw. and *D. nobile* Lindl. are found both in epiphytic and lithophytic habitat. The present availability status of these species are 4 common, 9 frequent, 14 sparse, 14 rare, 2 threatened and 5 are found in planted condition at different floral nurseries and institutions (Fig. 46).

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**Fig. 43. Rhynchostylis retusa** (L.) Bl.

**Fig. 44. Satyrium nepalense** D. Don, var. nepalense

**Fig. 45. Vanda cristata** Lindl.

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**Fig. 46. Present availability status of medicinal Orchid species in Darjeeling Himalaya**
Plant and plant parts used as medicine are roots, leaf, whole plant, both roots and leaves, rhizome, pseudobulbs, seeds, shoots, flowers, ripe fruits and tubers. The species which are used whole plant as a medicine cause the availability of species rare and threatened if it is epiphytic and terrestrial Orchids and their tubers and rhizomes are used as medicine also cause the species push to threatened status. The diseases, disorders and toxicity cured by these Orchids like rheumatism, neuralgia, scorpion and snake bites, stomach disorder, cuts and wounds, joint pain, swellings, tuberculosis, bodyache, stomachache, burn injuries, relieves pain, headache, fever, toothache, otitis, paralysis, earache, nervous disorders, madness, epilepsy, hysteria, spasms, ulcers, tumors, bone fracture, liver upsets, boils, pimples, cholera, flatulence, dyspepsia, night sweats, anorexia, eye infections, hyper acidity, boneache, vertigo, menstrual disorder, intestinal ulcer, urinary trouble, blood purifier, cancerous ulcers, gangrene, diarrhoea, jaundice, muscular pain, bleeding diathesis and phthisis, febrifuge and spermopiotic, asthma, liver diseases, amoebic dysentery, antifertility, typhoid fever, abscesses, skin rash, finger abscess, abdominal pain, skin diseases, malaria fever and acts as an expectorant. Some species have multiple utilities and some are used as revitalizer and energizing tonic and some are used as aphrodisiacs.

Many Orchid species contribute good herbal Ayurvedic medicine in the pharmaceutical industries. Many of these herbal medicines originated from Orchids used by the rural tribal societies of the world. They use these preparations rather than the allopathic drugs of modern market for their basic healthcare. They not only use herbal medicine but also use for food stuff in lean season. But present status of Orchid species are diminishing because of the regular threats in their natural population. Whole Orchidaceae family is facing maximum risk of threats in comparison to other plant species in the regions because of indiscriminate collection for ornamental interest, wild species trade for floral business, medicinal purposes, food stuffs, frequent landslides, over grazing of cattle and goats, frequent forest fire, urbanization, extension of agricultural lands and unplanned exploitation had resulted in loss of such medicinally important Orchids as well as other plant diversity of the region. Cutting of epiphytic host trees cause more harm to epiphytic species like Aerides, Bulbophyllum, Cymbidium, Paphionanthe, Vanda etc. and many species fall in endangered status because of the non availability of specific host tree in the region. Terrestrial Orchid species of some Himalayan regions are still intact in natural habitat but that will also no longer exist if cultivation and commercialization of these species is not taken in the region by encouraging local youths. Therefore, immediate conservation of all these valuable Orchids is necessary in their natural habitat as Orchids are very sensitive to ecological disturbances. Effective conservation measures have have to be taken up by arranging awareness programme, research and development programmes, multiplication by means of plant tissue culture and commercial cultivation are the alternative ways to save our valuable Orchid species diversity from the high risk of biodiversity loss in the world.

Darjeeling Himalaya is not an exception that is facing the threat of Orchid species extinction due to population pressure. Further, the region being highly prone to landslide, many valuable Orchids are being lost each year. There is urgent need to develop strategies on this issue. 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 or disturbance in the microclimatic conditions in habitat by many anthropogenic activities. At present number of Orchid enthusiasts, researchers and traders visit the region each year in search of Orchids. Although the trade of Orchid species is band by law but the way the species are vanishing from their natural habitats everyday is still a mysterious to law enforcers. An immediate step has to be taken for conservation of these species before they disappear forever especially for the species which are rare and threatened. The extension of agricultural lands, rapid deforestation and various developmental projects directly harm the natural population of Orchid species in Darjeeling Himalaya (Yonzone et al. 2012c). Wherever, Orchid species exist in nature, the falling of host plants should be cleared only after examination of such trees by conservationists or botanists (Yonzone et al. 2012d)

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