Orchids of Suspa-Kshamawoti, Dolakha - An annotated checklist

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Suspa-Kshamawoti area of Dolakha district covers diverse vegetation types and harbors many interesting species of orchids. This paper documents 69 species of orchids covering 33 genera based on repeated field surveys and herbarium collections. Of them, 50 species are epiphytic (including lithophytes) and 19 species are terrestrial. Information regarding habit and habitat, phenology, host species and elevational range of distribution of each species are provided in the checklist.

Keywords: Bulbophyllum, Nepal, Orchidaceae

Orchids are one of the most diverse and highly evolved groups of flowering plants, and orchidaceae is the largest family comprising 29,199 species and are globally distributed (Govaerts et al., 2017). Out of them, two-third belong to epiphytes (Zotz and Winkler, 2013). In Nepal, orchidaceae is one of the major families amongst the higher flowering plants and comprises 502 taxa belonging to 108 genera, which forms around 8 percent of our flora (Raskoti and Ale, 2019). The number of species might increase because many areas of Nepal are yet to be explored. With various growth forms, orchids are distributed from 62 m to 5,200 m, growing in various types of habitats in Nepal (Rokaya et al., 2013).

Due to their beautiful long-lasting flowers and the presence of important chemicals, orchids are harvested, grown and traded for various purposes as ornamental plants, medicinal products and food (Hinsley et al., 2017). Although with great diversity and prodigious economic and ecological values, orchids are also threatened by habitat destruction and fragmentation, unsustainable harvesting and illegal trade in Nepal. These activities are pushing many orchids into small populations in the wild and finally towards extinction.

Research on orchids has been carried out by several researchers in Nepal. Some notable contributions on documentation of orchid flora are made by Bajracharya (2001; 2004); Rajbhandari and BHattrai (2001); Bajracharya and Shrestha (2003); Rajbhandari and Dahal (2004); Milleville and Shrestha (2004); Subedi et al. (2011); Rajbhandari (2015); Raskoti (2015); Raskoti and Ale (2009; 2011; 2012; 2019) and Bhandari et al. (2016 b; 2019). Suspa-Kshamawoti, the northern part of the Dolakha district covers diverse vegetation and harbors some interesting species of orchids. Bhandari et al. (2016a) reported the endemic orchid Panisea panchasensis Subedi., from the same area with a very good population than in its type locality Panchase, Kaski, Nepal. However, no comprehensive record of orchid flora of this region is available till date. Thus, this research is aimed to document the orchid flora of Suspa-Kshamawoti area, the region outside the protected area. This work also highlights the importance of forest outside the protected area in maintaining orchid diversity.

Study area

The study area Suspa-Kshamawoti (now Bhimeshor Municipality-1), lies in the northern part of the Dolakha District (27°42'38. 82" N and 86°02'21. 88" E) (Figure 1). The elevation ranges from 1,603 m to around 2,600 m above mean sea level (amsl). The area, moreover, exhibits sub-tropical to lower temperate climate; therefore, experiences high rainfall during the monsoon period. Floristically,
the area is categorized into four forest types, viz. Schima-Castanopsis and Alnus nepalensis forest in the lower belt, and Daphniphyllum-Symplocos and Quercus semecarpifolia forest in the upper belt. Although the study area covers the narrow elevational gradient, it represents the diverse forest patches of older and major host tree species, such as Alnus nepalensis, Schima wallichii, Daphniphyllum himalense, Lyonia ovalifolia, Castanopsis indica and Eurya acuminata. These host trees support many interesting epiphytic orchids on their tree canopies.

Figure 1. Location of the study area in Nepal
A. Nepal, B. Dolakha district and C. Suspa-Kshamawoti (Study area)

Materials and methods

The present study is the result of extensive field surveys covering all the seasons during 2015–2019 AD in different localities of the Suspa-Kshamawoti region, the elevation of which ranges from 1,603 m to 2,500 m amsl. Different community forests were surveyed during the trips. All the orchid species encountered were recorded along with their voucher specimens adopting the standard technique of Jain and Rao (1977). In the case of epiphytic orchids, their host species were also noted. Photographs of each orchid and their host species (in case of epiphytes) were taken. The identification of species was done by adopting the methods of White and Sharma (2000); Rajbhandari and Bhattrai (2001); Raskoti and Ale (2009); Rajbhandari (2015), and Rajbhandari and Rai (2017). Roscov et al. (2019) was followed for the nomenclature and author citation of the genus and species. The collected specimens were deposited at the Tribhuvan University Central Herbarium (TUCH).

Results

This research enumerated 69 species of orchids belonging to 33 genera from the Suspa-Kshamawoti area (Appendix 1). The present study also reported 18 host species of 50 epiphytic orchids. Global distribution, distinguishing character, habit, phenology of flowering and their host species (in case of epiphytes) are also provided. Some photographs of epiphytic orchids are presented in Figure 2 and Figure 3 while the terrestrial orchids are provided in Figure 4.

Figure 2 : (A) Bulbophyllum retusiusculum, (B) B. yoksunense, (C) B. viridiflorum, (D) B. careyanum, (E) Coelogyne cristata, (F) Cryptochilus luteus, (G) Cymbidium elegans, (H) Dendrobium amoenum and (I) D. heterocarpum

Figure 3. (A) Dendrobium porphyrochilum, (B) D. amplum, (C) Gastrochilus calceolaris, (D) Oberonia pachyrachis, (E) Otochilus porrectus, (F) Panisea panchaseensis, (G) Phalaenopsis taenialis, (H) Pleione humilis and (I) Vanda cristata
Discussion

The present study recorded 69 orchid species belonging to 33 genera from the Suspa-Kshamawoti region, Dolakha district. Of these, 50 species are epiphytic and 19 species are terrestrial. This shows the dominance of epiphytic orchids in the study area where there is the presence of most preferable host trees, like *S. wallichii*, *A. nepalensis*, *Rhododendron arboreum* and *D. himalense*. Orchid species, such as *Uncifera acuminata*, *Porpax elwesi*, *D. amoenum*, *Rynchostylis retusa*, *B. careyanum*, *D. moniliforme*, *Luisia tristis*, and *D. amplum* were found to be very rare in the study area, whereas *B. reptans*, *D. heterocarpum*, *Vanda cristata*, *G. calceolaris*, *Eria coronaria*, *Liparis resupinata*, *Oberonia pachyrachis* and *Oberonia falcata* were commonly noticed. Out of the 33 genera present, *Bulbophyllum* was found to be the largest one comprising 11 species followed by *Dendrobium* with 7 species. Epiphytic orchids were mostly recorded on the host trees, like *S. wallichii*, *D. himalense* and *A. nepalensis*, the most preferred host species of epiphytic orchids.

It showed that the forests outside the protected area have also supported for many rare and endangered species of orchids to thrive well. Therefore, it is important to save the patches of the forest outside the protected area as they function as habitat islands, which have continuously maintained the population of many endangered orchid species. Thus, it is recommended that future conservation plans should focus on the conservation of forests outside the protected area for long-term conservation of orchid resources.

Conclusion

The environmental and climatic condition of the Suspa-Kshamawoti area is suitable for various epiphytic and terrestrial species of orchids. The moist deciduous forest floor has supported many terrestrial species whereas the large trees with fissured bark covered with moss have supported many epiphytic orchid species to flourish. The destruction of habitats due to deforestation and construction activities have resulted in drastic depletion of orchid species in the study area. The selective logging of trees, such as *Schima wallichii*, *A. nepalensis*, *R. arboreum*, and *D. himalense* has increased for timber extraction. This has severely reduced the number of epiphytic orchids in the study area. Therefore, it is necessary to conserve habitats and the most preferable host species in order to conserve many orchid species in the wild.

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AGROSTROPHYLLUM Bl.
About 60 species distributed in the Old World tropics from Seychelles and tropical Asia east to the Pacific Island, New Guinea as the center of distribution (Chen et al., 2009); 2 species in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.
Agrostophyllum callosum Rchb. f. in Seem., Fl. Vit.: 296 (1868).
Habit: Epiphyte, flowers pinkish white.
Flowering: May-Aug. Exsiccate: Karki S. 005 (TUCH)
Altitude: 1,820 m
Habitat: Epiphyte in mixed deciduous forest and humid evergreen forest
Host species: Schima wallichii, Daphniphyllum himalense and Lyonia ovalifolia

ANTHOGONIUM Wall. ex Lindl.
Only one species distributed in Bangladesh, Bhutan, Cambodia, China, N India, Laos, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam (Chen et al., 2009); 1 species in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.
Anthogonium gracile Wall. ex Lindl., Gen. Sp. Orchid. Pl.: 426 (1840). Fig. 4C
Anthogonium corydaloides Schlr.
Habit: Terrestrial, flowers pink to white.
Flowering: Aug-Nov. Exsiccate: Karki S. 006 (TUCH)
Altitude: 1,620–1,780 m
Habitat: Terrestrial growing on grassy slopes and rock

BULBOPHYLLUM Thouars.
About 1,900 species distributed in tropical areas of both Old and New Worlds (Chen et al., 2009); 36 species in Nepal (Rajbhandari and Rai, 2017; Raskoti and Ale, 2019), 11 species in Suspa-Kshamawoti.
Bulbophyllum affine Wall. ex Lindl. Gen. Sp. Orchid. Pl.: 48 (1830).
Bulbophyllum kusukusense Hayata
Habit: Epiphyte, flowers white with pink-lined, solitary.
Flowering: May-Aug. Exsiccate: Karki S. 007 (TUCH)
Altitude: 1,723 m
Habitat: Epiphyte in mixed deciduous forest
Host species: Schima wallichii and Lyonia ovalifolia

Appendix 1. Orchid checklist
**Bulbophyllum cirrhatum** (Lindl.) Hook. f.

**Habit**: Epiphyte, white purple veins, 4-8 flowered, lip purple.

**Flowering**: Oct-Dec. *Exsiccatae*: Karki S. 0012 (TUCH)

**Altitude**: 1,800–2,215 m

**Habitat**: Epiphyte on tree trunks

**Host species**: *Schima wallichii*

**Bulbophyllum reptans** (Lindl.) Lindl. ex Wall., Numer. List : n. 1988 (1829).

**Habit**: Epiphyte, flowers 3-6, pale yellow with purplish-red stripes.

**Flowering**: Jan-Mar. *Exsiccatae*: Karki S. 0013 (TUCH)

**Altitude**: 1,930–2,400 m

**Habitat**: Epiphyte on evergreen forest or lithophytic on rocks

**Host species**: *Schima wallichii, Daphniphyllum himalense* and *Symplocos sp.*

**Bulbophyllum retusiusculum** Rchb. f., Gard. Chron. 1869 : 1182 (1869). Fig. 2A

**Cirrhopetalum retusiusculum** (Rchb. f.) Hemsley, Gard.

**Habit**: Epiphyte, flowers yellow with reddish veins.

**Flowering**: Sep-Dec. *Exsiccatae*: Karki S. 0014 (TUCH)

**Altitude**: 2,400 m

**Habitat**: Epiphyte on tree trunks

**Host species**: *Rhododendron arboreum*

**Bulbophyllum viridiflorum** Rchb. f., Gard. Chron. 1869 : 1182 (1869). Fig. 2C

**Cirrhopetalum viridiflorum** (Hook. f.) Schltr., Orchis 4 : 108 (1910). Fig. 2C

**Habit**: Epiphyte, flowers 5-12, yellow.

**Flowering**: Oct-Nov. *Exsiccatae*: Karki S. 0016 (TUCH)

**Altitude**: 2,300 m

**Habitat**: Epiphyte on tree trunks

**Host species**: *Daphniphyllum himalense*

**Bulbophyllum yoksunense** J. J. Sm. Bull. Jard. Buitenzorg 28 : 29 (1912). Fig. 2B

**Cirrhopetalum brevicornu** Hook. f.

**Habit**: Epiphyte, flowers 6-12, creamy white with pink stripes.

**Flowering**: Sep-Nov. *Exsiccatae*: Karki S. 0017 (TUCH)

**Altitude**: 2,000–2,210 m

**Habitat**: Epiphyte on subtropical mixed forest

**Host species**: *Daphniphyllum himalense* and *Symplocos ramosissima*

**CALANTHE** R. Brown

About 150 species distributed in tropical and subtropical Asia, Australia, New Guinea, SW Pacific Islands, as well as tropical Africa and Central and NW South America (Chen et al., 2009); 16 species in Nepal (Rajbhandari and Rai, 2017; Raskoti and Ale, 2019), 4 species in Suspa-Kshamawoti.

**Calanthe brevicornu** Lindl., Gen. Sp. Orchid Pl. : 251 (1833).

**Alismorkis brevicornu** (Lindl.)

**Habit**: Terrestrial, flowers laxy, 5-13 in number, yellowish-green with pinkish-red strations.

**Flowering**: May-Jun. *Exsiccatae*: Karki S. DO 1 (TUCH)

**Altitude**: 1,800–2,200 m

**Habitat**: Terrestrial in the dense forest floor

**Calanthe manni** Hook. f., Fl. Brit. Ind. 5 : 850 (1890).

**Calanthe brachychila** Gagnep.

**Habit**: Terrestrial, flowers dark brown, lip golden yellow.

**Flowering**: May-Jun. *Exsiccatae*: Karki S. DO 2 (TUCH)

**Altitude**: 1,800–2,200 m

**Habitat**: Terrestrial in the dense forest floor

**Calanthe plantaginea** Lindl., Gen. Sp. Orchid Pl. 250 (1833). Fig. 4A

**Alismorkis lindleyana** Kuntze

**Habit**: Terrestrial, flowers 12-25 or more, pinkish to white, scented.

**Flowering**: Mar-Apr. *Exsiccatae*: Karki S. DO 3 (TUCH)

**Altitude**: 1,950–2,200 m

**Habitat**: Terrestrial in the evergreen broad leaved forest floor

**Calanthe trulliformis** King & Pantl., J. Asiat. Soc. Bengal 64 (2) : 337 (1895).

**Habit**: Terrestrial, flowers chocolate brown, lip white, trowel-shaped.

**Flowering**: Jul. *Exsiccatae*: Karki S. DO 4 (TUCH)

**Altitude**: 1,800–2,200 m

**Habitat**: Terrestrial in the dense and humus-rich
About 200 species distributed in tropical and subtropical Asia to Oceania (Chen et al., 2009); 11 species in Nepal (Rajbhandari and Rai, 2017), 4 species in Suspa-Kshamawoti.

**Coelogyne corymbosa** Lindl., Fol. Orchid., Coelogyne 5: 7 (1854).

- **Pleione corymbosa** (Lindl.)
- **Habit**: Epiphyte, flowers white, lip with four yellow eyelike spots surrounded by red reddish-orange, lip 3 lobed.
- **Flowering**: May-Jun.
- **Exsiccatae**: Karki S. 0018 (TUCH)
- **Altitude**: 2,000–2,300 m

**Host species**: *Schima wallichii*, *Juglans regia* and *Daphniphyllum himalense*

**Coelogyne cristata** Lindl., Collect. Bol.: sub t. 33 (1824). Fig. 2E

- **Cymbidium speciosissimum** D. Don
- **Habit**: Epiphyte or lithophytes, flowers white, lip 3 lobed, callus having 5 fimbriate lamellae.
- **Flowering**: Feb-May.
- **Exsiccatae**: Karki S. 0019 (TUCH)
- **Altitude**: 1,700–2,110 m

**Host species**: *Schima wallichii*, *Castanopsis indica* and *Daphniphyllum himalense*

**Coelogyne fuscescens** Lindl., Gen. Sp. Orchid. Pl. 41 (1830).

- **Coelogyne fuscescens var. viridiflorum** Pradhan
- **Habit**: Epiphyte, flowers pale brown or ochre-yellow, large 2-5 flowered around 4 cm across, lip pale brown with dark brown spots, 3 lobed.
- **Flowering**: Oct-Dec.
- **Exsiccatae**: Karki S. 0020 (TUCH)
- **Altitude**: 1,700–2,110 m

**Host species**: *Schima wallichii*, *Juglans regia* and *Daphniphyllum himalense*

**Coelogyne longipes** Lindl., Fol. Orchid., Coelogyne 5: 10 (1854).

- **Pleione longipes** (Lindl.)
- **Habit**: Epiphyte, flowers white to yellow, small 5-7 flowered, lip apex truncate and emarginate, callus with 2 longitudinal lamellae.
- **Flowering**: May-Jun.
- **Exsiccatae**: Karki S. 0021 (TUCH)
- **Altitude**: 1,980–2,100 m

- **Host species**: *Schima wallichii* and *Daphniphyllum himalense*
CYMBIDIUM Sw.

About 55 species distributed in tropical and subtropical Asia, south to Papua New Guinea and Australia (Chen et al., 2009); 9 species in Nepal (Rajbhandari and Rai, 2017), 3 species in Suspa-Kshamawoti.

*Cymbidium elegans* Lindl., Gen. Sp. Orchid. Pl. 163 (1833). Fig. 2G

*Cymbidium longifolium* D. Don.

**Habit**: Epiphyte, flowers cream-yellow to pale yellowish-green, around 18-38 flowered, oblanceolate-triangular.

**Flowering**: Sep-Oct. **Exsiccate**: Karki S. 0025 (TUCH)

**Altitude**: 1,800−2,300 m

**Habitat**: Epiphyte on tree trunks

**Host species**: *Schima wallichii*, *Daphniphyllum himalense*

**Cymbidium erythraeum** Lindl., J. Proc. Linn. Soc. Bot. 3 : 30 (1859).

**Habit**: Epiphyte, flowers green with heavy reddish-brown longitudinal stripes, flower large 3-8 flowered, lip white with red-brown spots on the mid-lobe.

**Flowering**: Oct-Dec. **Exsiccate**: Karki S. 0026 (TUCH)

**Altitude**: 2,110−2,300 m

**Habitat**: Epiphyte on tree trunks

**Host species**: *Schima wallichii* and *Daphniphyllum himalense*

**Cymbidium lancifolium** Hook., Exot. Fl. 1 : t. 51 (1823)

*Cymbidium caulescens* Ridl.

**Habit**: Terrestrial, flowers white to pale green, flower large 2-6 flowered, lip white with purplish-brown markings.

**Flowering**: May-Aug. **Exsiccate**: Karki S. 0027 (TUCH)

**Altitude**: 1,500−2,400 m

**Habitat**: Terrestrial in deciduous forest

DENDROBIUM Sw.

Around 1,100 species in India across to Japan, south to Malaysia and Indonesia, east to Australia, New Guinea, and Pacific is lands (Chen et al., 2009); 26 species (Rajbhandari and Rai, 2017), 8 species in Suspa-Kshamawoti.

*Dendrobium amoenum* Wall. ex Lindl., Gen. Sp. Orchid. Pl. : 78 (1830). Fig. 2H

*Dendrobium mesochlorum* Lindl.

**Habit**: Epiphyte, flowers white with pale violet margins, flower many 2-3 cm across, lip white with violet spots on the apex and greenish-yellow on the middle region.

**Flowering**: May-Jun. **Exsiccate**: Karki S. 0028 (TUCH)

**Altitude**: 1,720−1,900 m

**Habitat**: Epiphyte on tree trunks

**Host species**: *Alnus nepalensis*, *Ficus auriculata*, *Schima wallichii* and *Daphniphyllum himalense*

*Dendrobium amputum* Lindl., Gen. Sp. Orchid. Pl. : 74 (1830). Fig. 3B

**Epigeneium amputum** Lindl.

**Habit**: Epiphyte, flowers yellowish-green, spotted with deep brown, 1 flowered, lip p and urate in outline, 3 lobed.

**Flowering**: Sep-Nov. **Exsiccate**: Karki S. 0029 (TUCH)

**Altitude**: 1,720−2,000 m

**Habitat**: Epiphyte on tree trunks

**Host species**: *Rhododendron arboreum* and *Schima wallichii*

*Dendrobium eriiflorum* Griff., Icon. Pl. Asiat. 3 : 316 (1851).

*Callista eriiflora* (Griff.)

**Habit**: Epiphyte, flowers greenish-cream, 7-10 flowered, lip curved and spotted with purple stripes.

**Flowering**: Sep-Oct. **Exsiccate**: Karki S. 0030 (TUCH)

**Altitude**: 1,720−1,900 m

**Habitat**: Epiphyte on tree trunks

**Host species**: *Alnus nepalensis* and *Schima wallichii*

*Dendrobium heterocarpum* Wall. ex Lindl., Gen. Sp. Orchid. Pl. : 78 (1830). Fig. 2I

*Dendrobium aureum* Lindl.

**Habit**: Epiphyte, flowers silver-white or creamy yellow, usually 10-15 flowered, scented, lip yellow with red stripes.

**Flowering**: Apr-May. **Exsiccate**: Karki S. 0031 (TUCH)

**Altitude**: 1,720−2,200 m

**Habitat**: Epiphyte on tree trunks in open forests.

**Host species**: *Alnus nepalensis*, *Schima wallichii*, *Buddleja asiatica* and *Castanopsis indica*

*Dendrobium longicornu* Lindl. in Edwards’s Bot. Reg. 16 : t 1315 (1830).

*Dendrobium bulleyi* Rolfe.

**Habit**: Epiphyte, flowers white, usually 1-5 flowered, pendulous, lip veined with yellow or orange, fimbriate.

**Flowering**: Sep-Nov. **Exsiccate**: Karki S. 0032 (TUCH)

**Altitude**: 1,720−2,400 m

**Habitat**: Epiphyte on tree trunks in open forests.
Host species: *Lyonia ovalifolia, Schima wallichii, Rhododendron arboresum* and *Daphniphyllum himalense*

**Dendrobium moniliforme** (L. ) Sw., Nova Acta Regiae Soc. Sci. Upsal. 6 : 85 (1799).

**Habit:** Epiphyte; flowers white, 2-5 or even more in number, lip white tip acute, lip with greenish-yellow on the middle region.

**Flowering:** Sep-Oct. Exsiccate: Karki S. 0033 (TUCH)

**Altitude:** 2,300 m

**Habitat:** Epiphyte on tree trunks

**Host species:** *Schima wallichii* and *Daphniphyllum himalense*

**Dendrobium porphyrochilum** Lindl., J. Proc. Linn. Soc. Bot. 3 : 18 (1859). Fig. 3A

**Habit:** Epiphyte, flowers pale green with red veins, 10 or even more in number, lip deep purplish-brown.

**Flowering:** May-Aug. Exsiccate: Karki S. 0034 (TUCH)

**Altitude:** 1,800−2,500 m

**Habitat:** Epiphyte on tree trunks

**Host species:** *Schima wallichii, Viburnum erubescens* and *Berberis* sp.

**ERIA** Lindl.

Eria (s. l.) comprises around 370 species, widespread in tropical Asia and the whole of the Malay Archipelago, east to New Guinea and Bougainvillea Island (Chen *et al*., 2009); 14 species in Nepal (Rajbhandari and Rai, 2017; Raskoti and Ale 2019), 1 species in Suspa-Kshamawoti.

**Eria coronaria** (Lindl.) Rchb. f., Ann. Bot. Syst. 6 : 271 (1861).

**Habit:** Epiphyte, flowers white with purple stripes, usually 1-6 in number, large, lip oblong in outline and curved.

**Flowering:** May-Jun. Exsiccate: Karki S. 0035 (TUCH)

**Altitude:** 1,700−2,500 m

**Habitat:** Epiphyte on tree trunks

**Host species:** *Schima wallichii* and *Daphniphyllum himalense*

**GASTROCHILUS** D. Don

About 47 species distributed from India and Sri Lanka to East Asia and South to Indonesia (Chen *et al*., 2009); 7 species in Nepal (Rajbhandari and Rai, 2017), 2 species in Suspa-Kshamawoti.

**Gastrochilus calceolaris** (Buch.-Ham. ex Sm.) Aerides calceolaris Buch. -Ham. Ex Sm. in Rees.

**Habit:** Epiphyte, flowers yellow with purplish-brown markings, lip with white epichile and yellow hypochile.

**Flowering:** Feb-Apr. Exsiccate: Karki S. 0036 (TUCH)

**Altitude:** 1,700−2,300 m

**Habitat:** Epiphyte on tree trunks

**Host species:** *Schima wallichii* and *Eurya acuminata*

**Gastrochilus distichus** (Lindl.) Kuntze, Revis. Gen. Pl. 2 : 661 (1891).

**Habit:** Epiphyte, flowers pale green with reddish-brown spots, 2-4 flowered, lip with saccate hypochile.

**Flowering:** Jan-May. Exsiccate: Karki S. 0037 (TUCH)

**Altitude:** 2,300 m

**Habitat:** Epiphyte on tree trunks

**Host species:** *Symplocos ramosissima, Eurya acuminata, and Quercus semecarpifolia*

**GOODYERA** R. Br.

About 100 species distributed in S Africa, Asia, NE Australia, Europe, Madagascar, North America including Mexico, SW Pacific Islands (Chen *et al*., 2009); 11 species in Nepal (Rajbhandari and Rai, 2017; Raskoti and Ale, 2019), 4 species in Suspa-Kshamawoti.

**Goodyera biflora** (Lindl.) Hook. f., Fl. Birt. India 6 : 114 (1890).

**Habit:** Terrestrial, flowers tubular, creamy white, usually 2 rarely 3 flowered.

**Flowering:** Feb-Jul. Exsiccate: Karki S. 0038 (TUCH)

**Altitude:** 2,200−2,300 m

**Habitat:** Terrestrial in humus-rich, moist soil

**Goodyera foliosa** (Ker-Gawl.) Hook., J. Proc. Linn. Soc. Bot. 25 : 73 (1889).

**Habit:** Terrestrial, flowers white, many (5-20) flowered, lip ovate.

**Flowering:** Feb-May. Exsiccate: Karki S. 0039 (TUCH)

**Altitude:** 2,000−2,100 m

**Habitat:** Terrestrial in humus-rich, moist soil

**Neottia procera** (Ker-Gawl.) Hook., Exot. Fl. L. : t. 39 (1823). Fig. 4F

**Habit:** Terrestrial, flowers white, many (5-20) flowered, lip ovate.

**Flowering:** Feb-May. Exsiccate: Karki S.
0040 (TUCH)  
Altitude: 900−2,000 m  
Habitat: Terrestrial in humus-rich, moist soil  

*Goodyera repens* (L.) R. Br.  

*Satyrium repens* L.  

Habit: Terrestrial, flowers tubular, creamy white, hairy, many-flowered.  
Flowering: Jan-Feb. Exsiccatae: Karki S. 0041 (TUCH)  

Altitude: 1,900−2,300 m  
Habitat: Terrestrial in humus-rich, moist soil  

*Habenaria* Willd.  

About 600 species distributed worldwide, mainly in tropical and subtropical areas (Chen et al., 2009); 17 species in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.  

*Habenaria arietina* Hook. f., *Fl. Brit. India* 6: 138 (1890).  

*Ochyrorchis arietina* (Hook. f.) Szlach.  

Habit: Terrestrial, flowers white or greenish-white, many-flowered, petals forming a hood.  
Flowering: Jun-Aug. Exsiccatae: Karki S. 0042 (TUCH)  

Altitude: 1,400−3,000 m  
Habitat: Terrestrial in damp places, sloppy grass lands  

*Herminium* R. Br.  

About 25 species distributed in Europe, parts of SW and C Asia, extending to E and SE Asia and the Himalayas (Chen et al., 2009); 24 species in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.  

*Herminium lanceum* (Thunb.) Vuijk, *Blumea* 11: 228 (1961).  

*Ophrys lancea* Thunb. Ex Sw.  

Habit: Terrestrial, flowers pale yellowish to green, many-flowered, petals forming a hood.  
Flowering: Jun-Aug. *Exsiccateae*: Karki S. 0043 (TUCH)  

Altitude: 1,700−2,400 m  
Habitat: Terrestrial in damp places, sloppy grass lands  

*Liparis* L. C. Rich.  

About 320 species: tropical Asia, New Guinea, Australia, SW Pacific Islands, subtropical and tropical Americas, Europe and North America (Chen et al., 2009); 18 species in Nepal (Rajbhandari and Rai, 2017; Raskoti and Ale, 2019), 3 species in Suspa-Kshamawoti.  

*Liparis cathcartii* Hook. f. in Hooker, *Icon. Pl.* 19: t. 1808 (1889). Fig. 4D  

*Leptorkis cathcartii* (Hook. f.) Kuntze  

Habit: Terrestrial, flowers green to purple, more than 10 flowered, lip elliptic-ovate.  
Flowering: Jun-Jul. *Exsiccateae*: Karki S. 0044 (TUCH)  

Altitude: 2,200−2,400 m  
Habitat: Terrestrial in moist, humus-rich soil  

*Liparis resupinata* Ridl., *J. Linn. Soc. Bot.* 22: 290 (1886).  

*Liparis ridleyi* Hook. f.  

Habit: Epiphyte, flowers pale green or greenish-yellow, 10-50 flowered, lip elliptic-oblong or ovate-oblong.  
Flowering: Oct-Dec. *Exsiccateae*: Karki S. 0045 (TUCH)  

Altitude: 1,800−2,500 m  
Habitat: Epiphytic on tree trunks  
Host species: *Daphniphyllum himalense* and *Eurya acuminata*  

*Liparis viridiflora* (Blume) Lindl., *Gen. Sp. Orchid. Pl.* : 31 (1830)  

*Malaxis viridiflora* Bl.  

Habit: Epiphyte, flowers pale yellowish-green, lip orbicular or ovate-orbicular.  
Flowering: Nov-Feb. *Exsiccateae*: Karki S. 0046 (TUCH)  

Altitude: 1,720−1900 m  
Habitat: Epiphytic on tree trunks  
Host species: *Daphniphyllum himalense* and *Schima wallichii*  

*Luisia* Gaudich.  

About 40 species distributed in Bhutan, China, India, Indochina, Indonesia, Japan, Malaysia, New Guinea, Pacific is lands, Philippines, Sri Lanka, and Thailand (Chen et al., 2009); 1 species in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.  

*Luisia tristis* (G. Forst.) Hook. f., *Fl. Brit. India* 6: 25 (1890).  

*Epidendrum triste* G. Forst.  

Habit: Epiphyte, flowers greenish-yellow, 2-4 flowered, lip oblong.  
Flowering: Mar-Aug. *Exsiccateae*: Karki S. 0047 (TUCH)  

Altitude: 1,741 m  
Habitat: Epiphytic on tree trunks  
Host species: *Fraxinus floribunda* and *Schima wallichii*  

*Oberonia* Lindl.  

Around 150-200 species, centered in tropical S and SE Asia but extending to tropical Africa, Madagascar, the Mascarene is lands, the Philippines, New Guinea, NE Australia, and the SW Pacific is lands across to Tahiti (Chen et al., 2009); 19 taxa in Nepal (Rajbhandari and Rai,
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2017, 3 species in Suspa-Kshamawoti.  

**Oberonia caulescens** Lindl., Fl. Orchid. Oberonia 2 : 7, no. 39 (1859)  
Malaxis caulescens (Lindl.) Rchb. f.  
**Habit**: Epiphyte, distichous, falcate leaves.  
**Flowering**: Jun-Jul.  
**Exsiccatae**: Karki S. 0069 (TUCH)  
**Altitude**: 2,000–2,200 m  
**Habitat**: Epiphyte, on tree trunks  
**Host species**: Buddleja asiatica and Daphniphyllum hisalense  
**Oberonia falcate** King & Pantl., J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 64 (2) : 329 (1895).  
**Oberonia caudata** King & Pantl.  
**Habit**: Epiphyte, densely flowered, falcate leaves.  
**Flowering**: Jun-Jul.  
**Exsiccatae**: Karki S. 0048 (TUCH)  
**Altitude**: 1,700–2,200 m  
**Habitat**: Epiphyte, on medium-sized tree trunks  
**Host species**: Buddleja asiatica, Daphniphyllum hisalense, and Prunus cerasoides  
**Oberonia pachyrachis** Rchb. f. ex Hook. f., Fl. Brit. India 5 : 681 (1888). Fig. 3D  
**Oberonia umbraticola** Rolfe.  
**Habit**: Epiphyte, flowers pale brown, small many-flowered.  
**Flowering**: Nov-Mar.  
**Exsiccatae**: Karki S. 0049 (TUCH)  
**Altitude**: 1,700–2,115 m  
**Habitat**: Epiphyte, on tree trunks  
**Host species**: Alnus nepalensis, Schima wallichii, Prunus cerasoides and Fraxinus floribunda  

**ODONTOCHILUS** Blume.  
About 40 species: N India and the Himalayas, through SE Asia, as far north as Japan, east to the SW Pacific is lands (Chen et al., 2009); 3 species in Nepal (Raskoti and Kurzweil, 2015), 1 species in Suspa-Kshamawoti.  
**Odonochilus lanceolatus** (Lindl.) Bl., Coll. Orchid. 80 (1859). Fig. 4B  
**Anoectochilus lanceolatus** Lindl.  
**Habit**: Terrestrial, flower yellow, lip golden yellow.  
**Flowering**: Jun-Sep.  
**Exsiccatae**: Karki S. 0050 (TUCH)  
**Altitude**: 1,700–2,115 m  
**Habitat**: Terrestrial in humus-rich soil.  
**OTOCHELUS** Lindl.  
Around Four species: Bhutan, China, NE India, Myanmar, Nepal, Thailand, and Indochina (Chen et al., 2009); 4 species in Nepal (Rajbhandari and Rai, 2017), 2 species in Suspa-Kshamawoti.  

**ODONTOCHILUS** Blume.  
About 40 species: N India and the Himalayas, through SE Asia, as far north as Japan, east to the SW Pacific is lands (Chen et al., 2009); 3 species in Nepal (Raskoti and Kurzweil, 2015), 1 species in Suspa-Kshamawoti.  
**Odonochilus lanceolatus** (Lindl.) Bl., Coll. Orchid. 80 (1859). Fig. 4B  
**Anoectochilus lanceolatus** Lindl.  
**Habit**: Terrestrial, flower yellow, lip golden yellow.  
**Flowering**: Jun-Sep.  
**Exsiccatae**: Karki S. 0050 (TUCH)  
**Altitude**: 1,700–2,115 m  
**Habitat**: Terrestrial in humus-rich soil.  
**OTOCHELUS** Lindl.  
Around Four species: Bhutan, China, NE India, Myanmar, Nepal, Thailand, and Indochina (Chen et al., 2009); 4 species in Nepal (Rajbhandari and Rai, 2017), 2 species in Suspa-Kshamawoti.  

**Oberonia caulescens** Lindl., Fl. Orchid. Oberonia 2 : 7, no. 39 (1859)  
Malaxis caulescens (Lindl.) Rchb. f.  
**Habit**: Epiphyte, distichous, falcate leaves.  
**Flowering**: Jun-Jul.  
**Exsiccatae**: Karki S. 0069 (TUCH)  
**Altitude**: 2,000–2,200 m  
**Habitat**: Epiphyte, on tree trunks  
**Host species**: Buddleja asiatica and Daphniphyllum hisalense  
**Oberonia falcate** King & Pantl., J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 64 (2) : 329 (1895).  
**Oberonia caudata** King & Pantl.  
**Habit**: Epiphyte, densely flowered, falcate leaves.  
**Flowering**: Jun-Jul.  
**Exsiccatae**: Karki S. 0048 (TUCH)  
**Altitude**: 1,700–2,200 m  
**Habitat**: Epiphyte, on medium-sized tree trunks  
**Host species**: Buddleja asiatica, Daphniphyllum hisalense, and Prunus cerasoides  
**Oberonia pachyrachis** Rchb. f. ex Hook. f., Fl. Brit. India 5 : 681 (1888). Fig. 3D  
**Oberonia umbraticola** Rolfe.  
**Habit**: Epiphyte, flowers pale brown, small many-flowered.  
**Flowering**: Nov-Mar.  
**Exsiccatae**: Karki S. 0049 (TUCH)  
**Altitude**: 1,700–2,115 m  
**Habitat**: Epiphyte, on tree trunks  
**Host species**: Alnus nepalensis, Schima wallichii, Prunus cerasoides and Fraxinus floribunda  

**ODONTOCHILUS** Blume.  
About 40 species: N India and the Himalayas, through SE Asia, as far north as Japan, east to the SW Pacific is lands (Chen et al., 2009); 3 species in Nepal (Raskoti and Kurzweil, 2015), 1 species in Suspa-Kshamawoti.  
**Odonochilus lanceolatus** (Lindl.) Bl., Coll. Orchid. 80 (1859). Fig. 4B  
**Anoectochilus lanceolatus** Lindl.  
**Habit**: Terrestrial, flower yellow, lip golden yellow.  
**Flowering**: Jun-Sep.  
**Exsiccatae**: Karki S. 0050 (TUCH)  
**Altitude**: 1,700–2,115 m  
**Habitat**: Terrestrial in humus-rich soil.  
**OTOCHELUS** Lindl.  
Around Four species: Bhutan, China, NE India, Myanmar, Nepal, Thailand, and Indochina (Chen et al., 2009); 4 species in Nepal (Rajbhandari and Rai, 2017), 2 species in Suspa-Kshamawoti.  

**Otochilus lancilabius** Seidenf., Bot. Tidsskr. 71 : 13. T. 11 (1976).  
**Otochilus albus** var. lancilabius (Seidenf.) Pradhan  
**Habit**: Epiphyte, flowers white, small many-flowered.  
**Flowering**: Oct-Nov.  
**Exsiccatae**: Karki S. 0051 (TUCH)  
**Altitude**: 2,115 m  
**Habitat**: Epiphyte on tree trunks  
**Host species**: Daphniphyllum hisalense  
**Otochilus porrectus** Lindl., Gen. Sp. Orchid. Pl. : 36 (1830). Fig. 3E  
**Otochilus latifolius** Griff.  
**Habit**: Epiphyte, flowers white, small many-flowered, lip 3 lobed.  
**Flowering**: Oct-Dec.  
**Exsiccatae**: Karki S. 0052 (TUCH)  
**Altitude**: 1,870–2,115 m  
**Habitat**: Epiphyte on tree trunks  
**Host species**: Schima wallichii and Daphniphyllum hisalense  

**PANISEA** (Lindl.) Steud.  
About 7 species distributed in Bhutan, Cambodia, China, North East India, Laos, Myanmar, Nepal, Thailand, Vietnam (Chen et al., 2009); 3 species in Nepal (Rajbhandari and Rai, 2017), 2 species in Suspa-Kshamawoti.  
**Panisea demissa** (D. Don) Pfitz. In Engler, Pfl. -reich IV. 50, Ht. 32 : 141, t. 49 (1907).  
**Dendrobium demissum** D. Don.  
**Habit**: Epiphyte, flowers white, 5-8 flowered, lip sigmoid shaped.  
**Flowering**: Oct-Jan.  
**Exsiccatae**: Karki S. 0053 (TUCH)  
**Altitude**: 2,000–2,300 m  
**Habitat**: Epiphyte on tree trunks  
**Host species**: Daphniphyllum hisalense and Symplocos sp.  
**Panisea panchaseensis** Subedi, Nord. J. Bot. 29 (3) : 361 (2011). Fig. 3F  
**Habit**: Epiphyte, flowers white, 1-3 flowered, lip tip acute.  
**Flowering**: Oct-Jan.  
**Exsiccatae**: Karki S. 0054 (TUCH)  
**Altitude**: 2,100–2,500 m  
**Habitat**: Epiphyte on tree trunks  
**Host species**: Daphniphyllum hisalense and Quercus semecarpifolia  

**PERISTYLUS** Bl.  
About 70 species distributed in E, S, and SE Asia to New Guinea, NE Australia, and the SW Pacific Islands (Chen et al., 2009); 11 species in Nepal
Karki & Ghimire

(Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.

**Peristylus aristatus** Lindl., Gen. Sp. Orchid. Pl. : 300 (1835).

**Habenaria aristata** (Lindl.) Hook. f.

**Habit**: Terrestrial, flowers green, many-flowered, lip longer than sepal and petals.

**Flowering**: Aug-Sep. **Exsiccate**: Karki S. 0055 (TUCH)

**Altitude**: 2,300–2,500 m

**Habitat**: Terrestrial on humid and humid slopes

**Host species**: *Daphniphyllum himalense* and *Symplocos* sp.

**Pleione** D. Don

About 25 species distributed throughout Nepal, across C, S, and E China and Bhutan, south to Laos, Myanmar, Thailand, and Vietnam (Chen *et al.*, 2009); 5 species in Nepal (Rajbhandari and Rai, 2017), 2 species in Suspa-Kshamawoti.

**Pleione humilis** (Sm.) D. Don, Prodr. Fl. Nepal. : 37 (1825). Fig. 3H

**Coelogyne humilis** (Sm.) Lindl.

**Habit**: Epiphyte, flowers white, lip white, spotted with crimson or yellow-brown.

**Flowering**: Feb-Mar. **Exsiccate**: Karki S. 0059 (TUCH)

**Altitude**: 2,135–2,500 m

**Habitat**: Epiphytic on tree trunks

**Host species**: *Quercus semecarpifolia*, *Daphniphyllum himalense*, and *Symplocos* sp.

**Pleione praecox** (Sm.) D. Don, Prodr. Fl. Nepal. : 37 (1825).

**Coelogyne praecox** (Sm.) Lindl.

**Habit**: Epiphyte, flowers pink with yellow callus, lip fimbriate.

**Flowering**: Sep-Nov. **Exsiccate**: Karki S. 0060 (TUCH)

**Altitude**: 1,800–2,500 m

**Habitat**: Epiphytic on tree trunks

**Host species**: *Daphniphyllum himalense*, *Schima wallichii* and *Symplocos* sp.

**Porpax** Lindl.

About 11 species: mainly in and Asia, from India through Thailand and Indochina to Peninsular Malaysia (Chen *et al.*, 2008); 2 species in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.

**Porpax elwesii** (Rchb. f.) Rolfe, Orchid. Rev. 16 : 8 (1908).

**Eria elwesii** Rchb. f.

**Habit**: Epiphyte or lithophyte, flowers dark red or chocolate color, one flowered.

**Flowering**: Apr-Aug. **Exsiccate**: Karki S. 0061 (TUCH)

**Altitude**: 1,700–1,920 m

**Habitat**: Epiphytic or lithophyte

**Host species**: *Schima wallichii*
RHYNCHOSTYLIS Bl.
About 4 species distributed in India, Sri Lanka, Myanmar, South East Asia, Malaysia, Philippines and Indonesia (Chen et al., 2009); 1 species in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.

*Rhynchostylis retusa* (L.) Bl., Bijdr. Fl. Nederl. Ind. 7 : 286, t. 49 (1825).

**Habit** : Epiphyte, flowers purplish pink, lip apex and spur white.

**Flowering** : Jun-Jul.
**Exsiccatae** : Karki S. 0062 (TUCH)

**Altitude** : 1,750 m

**Habitat** : Epiphytic on tree trunks

**Host species** : *Alnus nepalensis* and *Ficus* sp.

SATYRIUM Lw.
About 90 species distributed mainly in S Africa, with a few species also found in S Asia (Chen et al., 2009); 1 species and 1 variety in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.

*Satyrium nepalense* D. Don, Prodr. Fl. Nepal. 26 (1825).

*Satyrium albiforum* A. Rich.

**Habit** : Terrestrial, flowers whitish pink or pale purple, floral bract reflexed.

**Flowering** : Jul-Nov.
**Exsiccatae** : Karki S. 0063 (TUCH)

**Altitude** : 2000-2500 m

**Habitat** : Terrestrial on moist areas like grasslands.

SPIRANThES Rich.
About 50 species distributed in North America, Africa, Asia, Australia, Central, and South America, and Europe (Chen et al., 2009); 2 species in Nepal (Rajbhandari and Rai, 2017), 2 species in Suspa-Kshamawoti.

*Spiranthes sinensis* (Pers.) Ames, Orchid. 2 : 53 (1908), Fig. 4E

*Neottia sinensis* Pers.

**Habit** : Terrestrial, flowers pink, lip white, many-flowered.

**Flowering** : Jul-Aug.
**Exsiccatae** : Karki S. 0064 (TUCH)

**Altitude** : 1,900−2,100 m

**Habitat** : Terrestrial on moist areas, wetland

UNCIFERA Lindl.
About six species distributed in Tropical Himalayan regions to Indochina and Thailand (Chen et al., 2009); 2 species in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.

*Uncifera acuminata* Lindl., J. Linn. Soc. Bot. 3 : 40 (1859).

*Saccolabium acuminatum* (Lindl.) Hook. f.

**Habit** : Epiphyte, flowers yellow, many-flowered.

**Flowering** : Apr-Jun.
**Exsiccatae** : Karki S. 0066 (TUCH)

**Altitude** : 1,670 m

**Habitat** : Epiphyte on tree trunks

**Host species** : *Eurya acuminata* and *Schima wallichii*

VANDA Jones ex R. Br.
About 40 species distributed in tropical Asia to New Guinea and Australia (Chen et al., 2009); 7 species in Nepal (Rajbhandari and Rai, 2017; Raskoti and Ale, 2019), 1 species in Suspa-Kshamawoti.

*Vanda cristata* Lindl. Gen. Sp. Orchid. Pl. 216 (1833), Fig. 31

*Trudelia cristata* (Wall. ex Lindl.) Senghas

**Habit** : Epiphyte, flowers yellowish-green, lip golden yellow to white, two-lobed.

**Flowering** : May.
**Exsiccatae** : Karki S. 0067 (TUCH)

**Altitude** : 1,670−2,200 m

**Habitat** : Epiphyte on tree trunks

**Host species** : *Prunus cerasoides*, *Schima wallichii*, *Alnus nepalensis*, *Euphorbia royleana*, *Buddleja asiatica* and *Ficus* sp.

VANDOPSIS Pfitz.
About five species distributed in India, China, main l and SE Asia, the Philippines, the Malay Archipelago to New Guinea (Chen et al., 2009); 1 species in Nepal (Rajbhandari and Rai, 2017), 1 species in Suspa-Kshamawoti.

*Vandopsis undulata* (Lindl.) J. J. Sm., Natuurk. Tijdschr. Ned. -Indio 72 : 77 (1912).

*Vanda undulata* Lindl.

**Habit** : Epiphyte, flowers white, fragrant, lip yellow to white.

**Flowering** : May-Jun.
**Exsiccatae** : Karki S. 0068 (TUCH)

**Altitude** : 1,670−2,300 m

**Habitat** : Epiphyte on tree trunks

**Host species** : *Daphniphyllum himalense*, *Quercus semecarpifolia* and *Schima wallichii*