

# A NEW RECORD OF *CYMBIDIUM GOERINGII* (RCHB.F.) RCHB.F. (ORCHIDACEAE) FOR THE FLORA OF HIMACHAL PRADESH, NORTHWESTERN HIMALAYAS, INDIA

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## Abstract

*Cymbidium goeringii* (Rchb.f.) Rchb.f. is reported for the first time from Himachal Pradesh. It is a terrestrial herb; roots thick and fleshy. Pseudobulbs small, ovoid, enclosed in bladeless sheaths. Leaves 5-7, narrowly elliptic, linear, acute, margins serrate, 40-80 × 0.2-1.0 cm. Inflorescence erect, 1-flowered; peduncle slender. The detailed morphological description, distribution, species associates, ecology, and conservation status is provided.

## Introduction

THE HIMALAYAS has attained a unique position owing to its large altitudinal range, steep gradient, diverse habitats, snow capped mountains, complex geological structure, and rich flora. The Indian Himalayan region (IHR) as a whole supports nearly 50% of the total flowering plants in India, of which 30% flora is endemic to the region. It is one of the mega diverse regions of India and supports about 8,500 flowering plants (Singh and Hajra, 1996). This region is one of the largest vaults of orchids. Orchidaceae is considered as the second largest family of flowering plants, with estimates of 705 genera (POWO, 2023) and 29,481 species (WFO, 2023) with more than 1,50,000 man-made hybrids (De and Pathak, 2020; Prakash and Pathak, 2020a). These plants rank amongst the most significant ornamental plants, known for the beauty, colour combinations, and shape of their flowers and have always been interesting to evolutionary biologists because of their remarkable floral forms and diversity in pollination systems (Prakash and Pathak, 2020b, 2022). Orchids are widely distributed in the tropical, sub-tropical, temperate, sub-alpine, and alpine regions in all continents except Antarctica, but reach their maximum diversity in the humid tropical regions. Orchidaceae covers the 6.8% of the flowering plants in India (Samant, 2002) along with over 1,256 species belonging to 155 genera (Singh *et al.*, 2019).

Earliest botanical exploration of orchids in the Himalaya was started by Thomas Hardwicke, the first European to collect plants during 1796. J.F. Royle in 1839 made extensive collection of plants from Kashmir to Himachal Pradesh and Garhwal. Systematic studies on the orchids in Himalayas have so far been carried out by a few workers while exploring the flora (Akhtar *et al.*, 2011;

Chowdhery and Wadhwa, 1984; Deva and Naithani, 1986; Jaryal *et al.*, 2021; Pangtey *et al.*, 1991; Prakash and Pathak, 2019; Verma *et al.*, 2021; Vij *et al.*, 2013).

The genus *Cymbidium* is one of the most popular and widely cultivated genera, with about 86 accepted species ranging from terrestrial to epiphytic or lithophytic habit (POWO, 2023). The genus derives its name due to shape of its lip from Greek word, *kymbes* (boat shaped). Species of this genus are naturally distributed in Japan, China, Korea, India, Malaysia, Vietnam, Borneo, Nepal, Taiwan, Philippines, Thailand, New Guinea, Sri Lanka, Myanmar, and Australia (Bose *et al.*, 1999; Misra, 2007). In India, majority of the species are concentrated in Eastern Himalayas (David and Phillip, 2007) and represented by 25 species (Singh *et al.*, 2019), out of which 8 are reported from Himalayas (Samant, 2002, 2009). Only one species *i.e.* *Cymbidium macrorhizon* Lindl. has been reported from NorthWestern Himalayas (Jammu & Kashmir, Ladakh; Himachal Pradesh) and eight species *i.e.* *Cymbidium aloifolium* (L.) Sw., *C. bicolor* Lindl., *C. cyperifolium* Wall. ex Lindl., *C. eburneum* Lindl., *C. erythraeum* Lindl., *C. hookerianum* Rchb.f., *C. iridoides* D.Don, *C. macrorhizon* Lindl. were reported from Western Himalayas [Uttarakhand (Kumaun and Garhwal region)] (Jalal *et al.*, 2008; Pangtey *et al.*, 1991; Samant, 2002, 2009).

*Cymbidium* plants are sympodial and grow up to the height of 30-60 cm. Plants bear long, narrow flag-like foliage and produce racemes as high as 60 cm, with arching sprays, and coloured waxy flowers. Stems of the plant are short, rarely elongated, and have ovoid pseudo-bulbs. The scape is loosely sheathed, with flowers often large in a sub-erect or dropping raceme.



Fig. 1. *Cymbidium goeringii* in its natural habitat.

The attractive flower colours of this genus include white, green, yellowish-green, cream, yellow, brown, pink, and red. *Cymbidium* generally prefers a warm-cold temperature variation and flowering is mostly not initiated at higher temperatures. *Cymbidium* species are mostly suited to a temperature range of 10°C-25°C.



Fig. 2. Associated forest type of *Cymbidium goeringii*.

These generally prefer partial light condition as the species grows mostly on trees or in soils of forest areas.

John Lindley first described this species as *C. virescens*, based on a specimen collected from Japan,



*Crepidium acuminatum*



*Polystichum squarrosum*



*Peristrophe bicalyculata*



*Rubus ellipticus*



*Arisaema tortuosum*



*Ajuga bracteosa*

Fig. 3. Associated ground vegetation of *Cymbidium goeringii*.



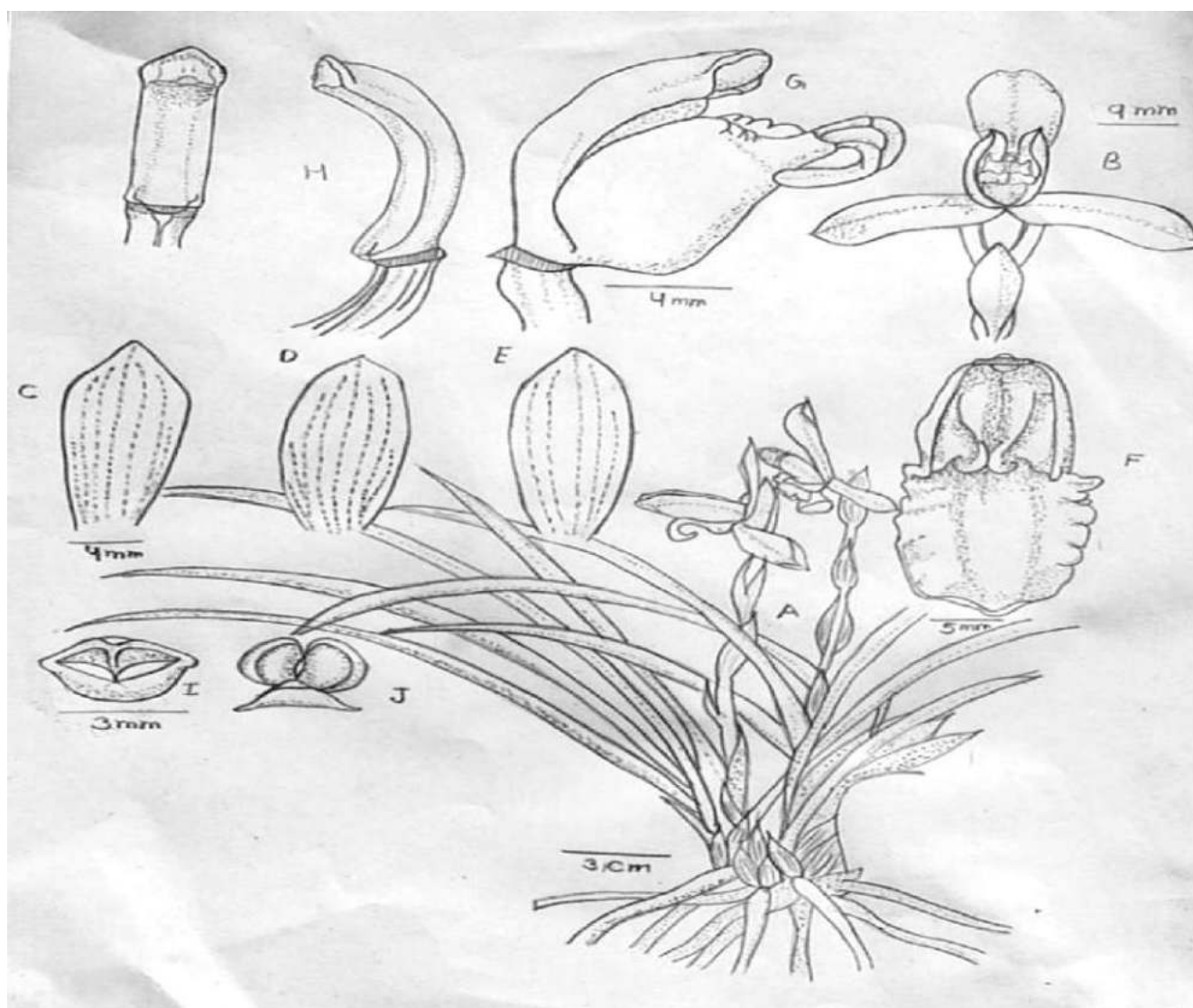


Fig. 4. *Cymbidium goeringii* drawn from published sample of Gunma Pref., Japan by Mutsuko Nakajima. A, Habit; B, Flower; C, Dorsal sepal; D, Petal; E, Lateral sepal; F, Lip, flattened; G, Column, ovary, and lip, side view; H, Column, two views; I, Anther-cap; J, Pollinarium.

in 1838. It was an illegitimate name for *C. goeringii*. It is easily recognised by its grass-like leaves and usually one-flowered inflorescence. *Cymbidium goeringii* is a variable species that is widely distributed across Eastern Asia from Japan and Taiwan to China and the Eastern Himalayas.

During the exploration of floristic diversity in Himachal Pradesh in February 2020, the first author collected a specimen of *Cymbidium* from Chail Chowk area in Mandi district (Fig. 1). Standard quadrat method was followed for assessment of biodiversity in this region. After detailed morphological studies, consultation of herbaria, and going through a monographic study of the genus *Cymbidium* (Pearce and Cribb, 2002), along with the help of standard references and floras (Chowdhery, 1998; Chowdhery and Wadhwa, 1984;

Hooker, 1890; Rao, 2010; Samant, 2002), the orchid was identified as *Cymbidium goeringii*. A detailed review on the species revealed that *Cymbidium goeringii* (Rchb.f.) Rchb.f. has not been reported from the state of Himachal Pradesh (Akhtar *et al.*, 2011; Deva and Naithani, 1986; Kumar and Manilal, 1994; Vij *et al.*, 2013). Hence, this is the new record for the state of Himachal Pradesh. Occurrence of this species in Himachal Pradesh expected its distribution in other NorthWestern part of the Himalayas. However, due to its leaves resembling with grasses, this species would have been easily overlooked by researchers over a long time. The present paper provides associated forest type, associated vegetation, and its detailed description based on collected specimen and ecology of the species (Figs. 2-4).

## Taxonomic Treatment

*Cymbidium goeringii* (Rchb.f.) Rchb.f. in Walpers, Ann. Bot. Syst. 3: 547 (1852); H.J. Chowdhery, Orch. Fl. Arunachal Pradesh 263, f. 158. 1998, Japan, Goring s.n. (holo. W! Herb.No. 45003).

### Type:

*Maxillaria goeringii* Rchb.f. in Bot. Zeitung (Berlin) 3: 334, 1845. *C. mackinnonii* Duthie in J. Asiat. Soc. Bengal 71 (2):41. 1902; S. N. Hegde & A. N. Rao in Ind. J. Forestry 10(3); 194, 1987. *C. goeringii* var. *mackinnoni* (Duthie) A. N. Rao in J. Econ.Tax. Bot. 24(1); 214, 2000.

## Species Description

Terrestrial *herb*; *roots* thick, fleshy. *Pseudobulb* small, ovoid, enclosed in bladeless sheaths. *Leaves* 5-7, narrowly elliptic, linear, acute, margins serrate, 40-80 × 0.2-1.0 cm. *Inflorescence* erect, 1-flowered; peduncle slender, sheathed, 0.15 cm long; sheaths cylindrical at base, boat-shaped above, apex acute, 5.5-7.0 cm long; floral bracts scarious, boat-shaped, acute, 2.5-6 cm long. *Flower* 4-5 cm across; sepals and petals apple-green to red brown, stained red towards base, *lip* cream with crimson spots, callus cream to pale yellow, *column* pale green; pedicel and ovary 2.5-6.0 cm long. *Sepals* sub-similar, obovate to elliptic, obtuse to apiculate, margins incurved, 2.5-3.9 × 0.85-1.25 cm; dorsal sepal porrect; lateral sepal spreading. *Petals* oblong-ovate to oblong-elliptic, obtuse, usually covering the column, 1.85-3.0 × 0.85-1.1 cm. *Lip* sub-entire to 3-lobed, 1.7-2.6 × 1.0-1.6 cm (when spread); lateral lobes reduced, erect, rounded, papillose; mid-lobe broadly ovate to oblong, obtuse to rounded, recurved, papillose, 0.7-1.0 × 0.75-1.1 cm; disc with 2-ridged callus. *Column* 2-winged at apex, 1.3-1.9 cm long. *Fruit* fusiform, erect, 0.8 cm long.

### Flowering and Fruiting

November-March.

### Distribution

NorthEast India [Arunachal Pradesh, Uttarakhand (between 1500-1800 m amsl)], China, Korea, Bhutan, Japan, Taiwan, Malaysia, Vietnam, Borneo, Nepal, The Philippines, New Guinea, Australia, Myanmar, Thailand, and Cambodia.

### Habitat and Ecology

*Cymbidium goeringii* is a terrestrial orchid reported on litter ground in the shady moist forest at 1,450 m altitude

from Mandi district (Himachal Pradesh) (Fig. 1). It is found amidst grasses and ferns under the canopy of *Pinus wallichiana*, *Rhododendron arboreum*, and *Quercus oblongata* (Fig. 2). Its associated species include *Ajuga bracteosa*, *Arisaema tortuosum*, *Crepidium acuminatum*, *Desmodium elegans*, *Peristrophe bicalyculata*, *Polystichum squarrosus*, *Rubus ellipticus*, *Strobilanthes atropurpureus* (Fig. 3).

### Etymology

Named after Philip Friedrich Wilhelm Goring (1809-1876) who collected the type in Japan.

### Specimens Examined

Bhutan, Punakha district. Lobesa NRTI, 2 iii 1969, D.B. Gurungs.n. evergreen forest; 1,600 m amsl.

## Taxonomic Note

*Cymbidium goeringii* was earlier reported from Uttarakhand and West Kameng area of Arunachal Pradesh (Chowdhery, 1998; Rao, 2010). As the occurrence of this species in association with grasses made it difficult to identify in its natural habitats, the species might have escaped the attention of the past explorers. Further, the species is under high threat as its natural populations are on decline due to natural habitat destruction in the present study site and also by various anthropogenic factors including forest clearance for agricultural practices, timber operation, road construction, fodder collection and flower collection just because of its unique pattern and colour. Another reason for long time ignorance of this species could be its occurrence under the canopy of *Rhododendron arboreum* tree, as local inhabitants might have crushed this species unknowingly for flower collection of *R. arboreum*. The closest population of this species may be expected in similar associated forest types and physiographic localities in other parts of Himachal Pradesh and other parts of NorthWestern Himalayas. By locating similar populations in other areas of Himachal Pradesh, threat categorization of *Cymbidium goeringii* may be easily done. Based on threat categorization of species, there is a strong need for adoption of suitable conservation measures using *in vitro* methods of propagation and pollination studies. A few studies have already been made earlier in this direction so as to conserve some RET species of NorthWestern Himalayas (Bhowmik and Rahman, 2020, 2022; Laldusanga *et al.*, 2021; Mutum *et al.*, 2022; Pathak *et al.*, 2022, 2023; Sunita *et al.*, 2021; Thakur and Pathak, 2020, 2021; Tripura *et al.*, 2022; Vasundhara *et al.*, 2021)

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## References

- Akhtar, C., A. A. Khuroo, G. H. Dar, Z. S. Khan, and A. H. Malik. 2011. An updated checklist of orchids in the Indian Himalayan State of Jammu and Kashmir. *Pleione*, **5**(1): 1-9.
- Bhowmik, T. K. and M. M. Rahman. 2020. *In vitro* seed germination and micropropagation of *Dendrobium chrysotoxum* Lindl. (Golden Bow): A highly fragrant orchid species of Bangladesh. *J. Orchid Soc. India*, **34**: 69-77.
- Bhowmik, T. K. and M. M. Rahman. 2022. Seed germination, protocorm multiplication, and seedling development in *Dendrobium formosum* Roxb. ex Lindl. of Bangladesh- A study *in vitro*. *J. Orchid Soc. India*, **36**: 1-7.
- Bose, T. K., S. K. Bhattacharjee, P. Das, and U. C. Basak. 1999. *Orchids of India*. Naya Prokash, Calcutta, India.
- Chowdhery, H. J. and B. M. Wadhwa. 1984. *Flora of Himachal Pradesh*, Vol. 3. Botanical Survey of India, Calcutta, India.
- Chowdhery, H. J. 1998. *Orchid Flora of Arunachal Pradesh*, India. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- David, D. P. and C. Phillip. 2007. The Genus *Cymbidium*. The Royal Botanic Gardens, Kew, England.
- De, L. C. and Promila Pathak. 2020. Good agricultural practices of *Dendrobium* orchids. *J. Orchid Soc. India*, **34**: 35-43.
- Deva, S. and H. B. Naithani. 1986. *The Orchid Flora of North-West Himalaya*. Print and Media Associates, New Delhi, India.
- Hooker, J. D. 1890. *The Flora of British India*, Vol. 6. L. Reeve & Co., Kent, England, U.K.
- Jalal, J. S., P. Kumar, and G. S. Rawat. 2008. Orchidaceae, Uttarakhand, Western Himalaya, India. *Check List*, **4**(3): 304-20.
- Jaryal, Pratibha, Promila Pathak, and Vasundhara. 2021. Diversity, indigenous uses, morphological description, and conservation status of orchids of Kareri Lake And Triund Hill In District Kangra of Himachal Pradesh, NorthWestern Himalayas. *J. Orchid Soc. India*, **35**: 115-25.
- Kumar, C. S. and K. S. Manilal. 1994. *A Catalogue of Indian Orchids*. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Lalduhsanga, R. Jayanthi, B. N. Sathyanarayana, K. S. Nirmala, and Vena S. Anil. 2021. A comparative study of different nutrient media on the *in vitro* asymbiotic seed germination of two threatened wild orchids. *J. Orchid Soc. India*, **35**: 109-13.
- Misra, S. 2007. *Orchids of India- A Glimpse*. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Mutum, R. D., N. M. Chanu, T. N. Khangnaba, and B. Thongam. 2022. Propagation and conservation of selected orchids of Manipur. *J. Orchid Soc. India*, **36**: 95-101.
- Pangtey, Y. P. S., S. S. Samant, and G. S. Rawat. 1991. *Orchids of Kumaun Himalaya*. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Pathak, Promila, Anamika Kumari, Brent D. Chandler, and Lawrence W. Zettler. 2023. *In vitro* propagation and phytochemical analysis of *Vanda cristata* Wall. ex Lindl.: An endangered medicinal orchid of biopharmaceutical importance. *S. Afr. J. Bot.*, **153**: 109-23.
- Pathak, Promila, Sunita, Anamika Kumari, Babita Thakur, Vasundhara, and Madhu. 2022. Regeneration competence of an endangered orchid, *Vanda cristata* Wall. ex Lindl. using leaf explants: A study *in vitro*. *S. Afr. J. Bot.*, **151**: 1018-24.
- Pearce, N. R. and R. J. Cribb. 2002. *The Orchids of Bhutan*. Royal Botanic Garden, Edinburgh, USA.
- POWO. 2023. *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet. <http://www.plantsoftheworldonline.org>.
- Prakash, Ankush and Promila Pathak. 2019. Orchids of Water Catchment Wildlife Sanctuary, Shimla (Himachal Pradesh), NorthWestern Himalayas: Their diversity, status, indigenous uses, and conservation status. *J. Orchid Soc. India*, **33**: 65-77.
- Prakash, Ankush and Promila Pathak. 2020a. Ant facilitated pollination of *Herminium lanceum* (Thunb. ex Sw.) Vuijk (Orchidaceae)- An endangered terrestrial orchid of NorthWestern Himalayas. *J. Orchid Soc. India*, **34**: 11-15.
- Prakash, Ankush and Promila Pathak. 2020b. Effects of different concentrations of NPK on vegetative growth parameters of a floriculturally important epiphytic orchid, *Dendrobium chrysanthum* Wall. ex Lindl. *J. Orchid Soc. India*, **34**: 117-21.
- Prakash, Ankush and Promila Pathak. 2022. Bee Pollination in *Calanthe tricarinata* Lindl. (Orchidaceae)- An endangered orchid from NorthWestern Himalayas. *J. Orchid Soc. India*, **36**: 15-20.
- Rao, A. N. 2010. Orchid flora of Arunachal Pradesh- An update. *Bull. Arunachal For. Res.*, **26**(1-2): 82-110.
- Samant, S. S. 2002. Diversity, distribution and conservation status of orchids of Trans-NorthWest, and West Himalaya. *J. Orchid Soc. India*, **23**(1-2): 65-74.
- Samant, S. S. 2009. Diversity and conservation status of orchids in Askot Wildlife Sanctuary, West Himalaya. *J. Orchid Soc. India*, **23**(1-2):1-9.
- Singh, D. K. and P. K. Hajra. 1996. *Floristic Diversity*. Biodiversity Status in the Himalaya, New Delhi, India.
- Singh, S. K., D. K. Agrawala, J. S. Jalal, S. S. Dash, A. A. Mao, and P. Singh. 2019. *Orchids of India- A Pictorial Guide*. Botanical Survey of India, Kolkata, India.
- Sunita, Promila Pathak, and K. C. Mahant. 2021. Green pod culture of an endangered and medicinally important orchid, *Vanda cristata* Wall. ex Lindl. from Himachal Pradesh. *J. Orchid Soc. India*, **35**: 25-33.

- Thakur, Babita and Promila Pathak. 2020. *In vitro* propagation of *Herminium lanceum* (Thunb. ex Sw) Vuijk (Orchidaceae), through asymbiotic seed germination: A therapeutically important and endangered orchid from NorthWestern Himalayas. *J. Orchid Soc. India*, **34**: 61-67.
- Thakur, Babita and Promila Pathak. 2021. Application of organic additives for the enhancement of seed germination and seedling development in an endangered and medicinal orchid, *Rhynchostylis retusa* (L.) Blume through asymbiotic culture. *J. Orchid Soc. India*, **35**: 99-107.
- Tripura, A., M. A. Sumi, T. K. Bhowmik, and M. M. Rahman. 2022. *In vitro* seed germination and phytochemical screening of an epiphytic medicinal orchid, *Pholidota imbricata* W. J. Hook. of Bangladesh. *J. Orchid Soc. India*, **36**: 137-45.
- Vasundhra, Promila Pathak, and Anuprabha. 2021. *In vitro* asymbiotic seed germination and regeneration competence of leaf explants in *Satyrium nepalense* D. Don, a medicinally important, and an endangered terrestrial orchid of Kasauli Hills, Himachal Pradesh (Northwestern Himalayas). *J. Orchid Soc. India*, **35**: 73-82.
- Verma, Jagdeep, Kranti Thakur, Jaspreet K. Sembi, Kusum, and Promila Pathak. 2021. On the occurrence of a leafless *Cymbidium* in Western Himalaya. *J. Orchid Soc. India*, **35**: 147-51.
- Vij, S. P., J. Verma, and C. S. Kumar. 2013. *Orchids of Himachal Pradesh*. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- WFO. 2023. *World Flora Online*. Published on the internet; <http://www.worldfloraonline.org>. Accessed 21 January, 2023.