

Updated checklist of orchids of Himachal Pradesh (Northwest Himalaya) and the adjoining plains

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Abstract

Himachal Pradesh is an Indian state located in northwestern part of the Himalaya, a global biodiversity hotspot. An up-to-date checklist of orchids is provided for this state, along with the plains of five states/ Union territories (Jammu and Kashmir, Punjab, Haryana, Uttar Pradesh, Uttarakhand), surrounding it from northwest to southeast. The study area lies between 29°34'–33°12' N latitude and 75°06'–79°04' E longitude, and experiences vast altitudinal variation (250–7000 m a.s.l.). A total of 107 taxa (106 species and one variety) belonging to 47 genera are documented. Ninety-seven species are distributed in Himachal Pradesh and 23 in the adjoining plains. Majority of species are monsoon blooming ground-growers, which are distributed in mid-hills (1500–3200 m a.s.l.). A few species viz. *Cypripedium himalaicum*, *Dactylorhiza viridis*, *Galearis spathulata*, *Gymnadenia orchidis*, *Hemipilia chusua*, *Herminium monorchis*, and *H. pugioniforme* find distribution even beyond 4200 m elevation. Seven of the terrestrial species exhibit leafless mycoheterotrophic/ partial mycoheterotrophic life mode. Only twenty species grow in tree canopies as epiphytes; these flower during spring to early summer and distributed mainly in low hills and the plains (300–1500 m). Details on distribution range, phenology, and district-wise occurrence of various orchid species in the study area are provided, along with a small note on conservation.

Keywords

Biodiversity hotspot, Conservation, Himalaya, Life modes, Orchidaceae

Introduction

Orchids, members of family Orchidaceae, are world-famous for their attractive flowers and beautiful foliage. India with varied climatic conditions and diverse ecological habitats has a rich resource of wild orchids; more than 1250 species have so far been reported from the country. The Himalaya, which is one of the global biodiversity hotspots, supports a wide array of biotic elements including orchids. Around 800 species occur in Indian Himalayan Region (IHR), of which 116 are endemic ones (Singh et al. 2019 a). Orchids of Eastern Himalaya are dominantly epiphytic in their life mode, but majority of northwestern Himalayan species grow as terrestrials (Vij et al. 2013).

Periodic field surveys in natural habitats yield various types of findings. Over time, some species are newly added to a geographical area, some succumb to the climatic/ anthropogenic pressures, and some even alter their distributional patterns. Such changes call for revisions of the plant lists in various areas from time to time (Rao, Kumar 2018). Therefore, present attempt was made to document an updated checklist of orchids of Himachal Pradesh and its adjoining plains.

Materials and methods**Study area**

The study area comprises of Himachal Pradesh, an Indian state located in North-western part of the Himalayan range, and the adjoining plains (Fig. 1). Himachal Pradesh (30°22'–33°12' N latitude, 75°45'–79°04' E longitude) comprises of twelve districts with altitudes varying between 350–7,000 m a.s.l. The geographical expanse is of 55,673 Km², and there lies a huge variety of climatic conditions from hot and humid in the lower hills (up to 1500 m), temperate montane in the mid hills (1500–3200 m) and sub-arctic in the higher mountain regions (above 3200 m). This variation is well reflected in the habitat types (coniferous forests, broad-leaved and mixed forests, open grasslands, highland meadows, etc.) and floristic components of the state. Himachal Pradesh has five National Parks, 26 Wildlife Sanctuaries and three Conservation Reserves (Himachal Pradesh Forest Department 2025). The state is surrounded by the hilly terrains of Jammu and Kashmir, and Ladakh (Union territories) in the north and Tibet in the east. The northwestern and southeastern hills of the state, however, gradually merge into the adjoining plains of Jammu and Kashmir, Punjab, Haryana, Uttar Pradesh and Uttarakhand states. These plains have also been included under the scope of present checklist.

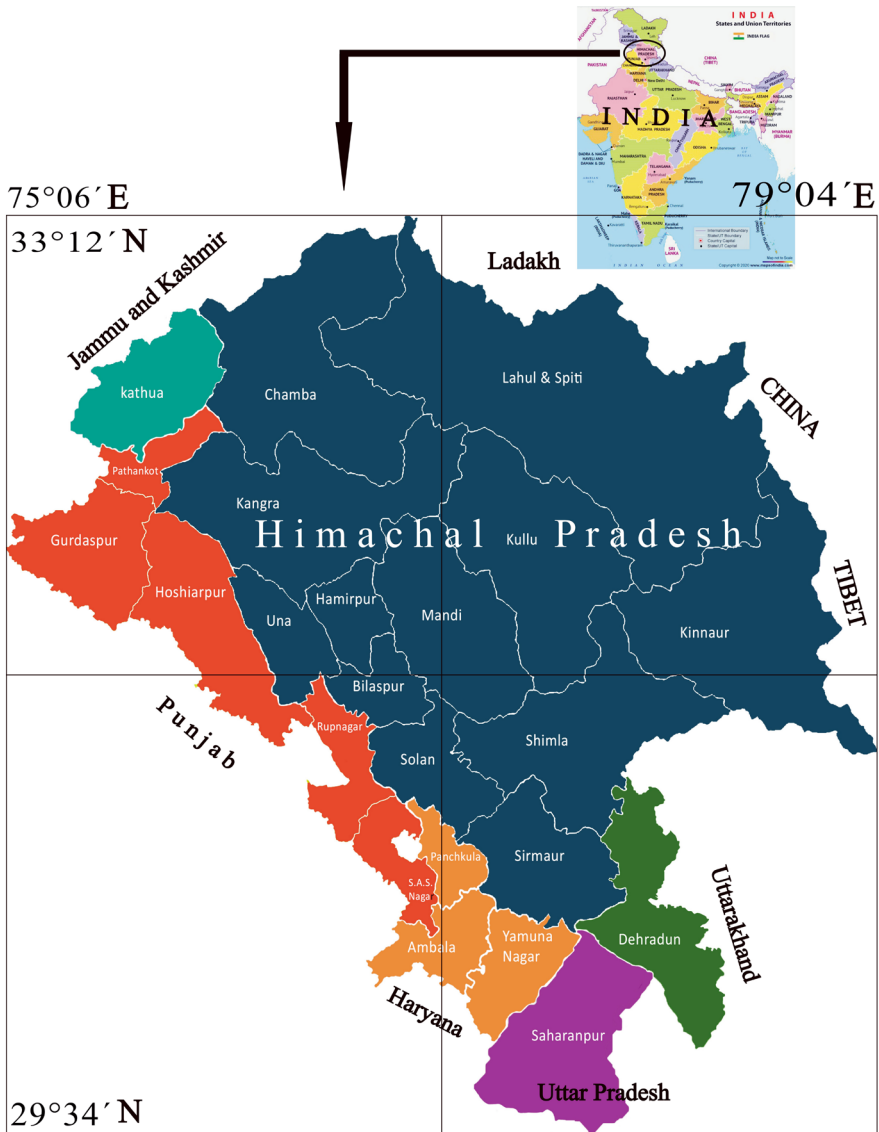


Figure 1. Map of study area showing the state of Himachal Pradesh (blue colour) and the adjoining plains of five Indian states/ Union territories surrounding it from northwest to southeast (shown in different colours).

Kathua district of Jammu and Kashmir lies in the northwest ($32^{\circ}16' - 32^{\circ}55'$ N Latitude, $75^{\circ}06' - 75^{\circ}54'$ E Longitude). The altitude ranges from 280 to 500 m a.s.l. and the climate is hot and humid subtropical. After this comes the plains of five districts of Punjab state (Pathankot, Gurdaspur, Hoshiarpur, Rupnagar, SAS Nagar) from west towards south ($30^{\circ}21' N - 32^{\circ}16' N$ Latitude, $75^{\circ}31' E - 76^{\circ}55' E$ Longitude). Their average elevation lies between 300–380 m a.s.l., and they expe-

rience humid subtropical climate. In southwest, the state is bound by Panchkula, Ambala and Yamunanagar districts of Haryana (29°50′ - 30°55′ N Latitude, 76°46′ - 77°12′ E Longitude). Having an average elevation of 250 – 350 m a.s.l., the region has a humid subtropical climate. A small portion of Saharanpur district of Uttar Pradesh (29°34′ - 30°21′ N Latitude, 77°09′ - 78°14′ E Longitude) touches the state in the south, and the plains of Dehradun district of Uttarakhand state (29°58′ to 31°02′ N Latitude, 77°34′ - 8°18′ E Longitude) in the southeast. The average elevation is 300 – 500 m and climate ranges between subtropical (plains of Doon valley) and temperate (towards hills).

Data collection

Present checklist is based on the repeated field surveys conducted in various localities of the study area during years 2014 – 2025. In addition to this, information is collected from available herbarium specimens (BSD, CAL, DD, TOSEHIM, PAN, PLP, WII) and literature reports including Collett (1902), Duthie (1906), Bamber (1916), Chowdhery, Wadhwa (1984), Deva, Naithani (1986), Chauhan (1990), Singh, Rawat (2000), Vij, Verma (2005), Rana et al. (2008), Verma et al. (2009, 2011, 2013), Manhas et al. (2010), Kant et al. (2012), Kumar (2012), Marpa, Samant (2012), Singh et al. (2013, 2019 b), Vij et al. (2013), Sharma et al. (2015, 2017, 2019), Attri, Verma (2016), Barman et al. (2016), Kumar et al. (2017, 2018, 2019, 2020), Devi et al. (2018), Khanna (2018), Prakash et al. (2018), Tyagi et al. (2020), Jaryal, Pathak (2021), Shukla et al. (2021), Gogoi et al. (2022), Chandra et al. (2023), Jyoti, Samant (2023), Magotha et al. (2023), Lata, Paul (2024), Chandra, Gogoi (2024), Thakur et al. (2025). POWO (2026) is followed for updated species nomenclature.

Results and discussion

A total of 107 taxa (106 species and one variety) belonging to 47 genera spread over four subfamilies, Cypripedioideae, Vanilloideae, Orchidoideae and Epidendroideae have been documented. Out of these, ninety-seven species find distribution in Himachal Pradesh and 23 in the plains; twelve species (*Aerides multiflora*, *Epipactis veratrifolia*, *Eulophia dabia*, *E. herbacea*, *Habenaria digitata*, *H. furcifera*, *H. plantaginea*, *Pachystoma pubescens*, *Rhynchostylis retusa*, *Spiranthes sinensis*, *Zeuxine membranacea*, *Z. strateumatica*) showed overlapping distribution in hills and the plains. Where majority of species (83 species) are ground-growing in Himachal Pradesh, the plains support proportionally more of epiphytes. Seven of the hilly terrestrials (*Cymbidium macrorhizon*, *Cyrtosia lindleyana*, *Epipogium aphyllum*, *E. roseum*, *Gastrodia falconeri*, *Neottia inayatii*, *N. listeroides*) grow as leaf-less mycoheterotrophs/partial mycoheterotrophs. On the other hand, five species (*Coelogyne articulata*, *C. cristata*, *Crepidium acuminatum*, *Pinalia spicata*, *Thunia alba* var. *bracteata*) exhibit lithophytic life mode, additionally. Figs 2–4 provide overview of some habitat types of the study area and a few orchid species exhibiting varied life modes.

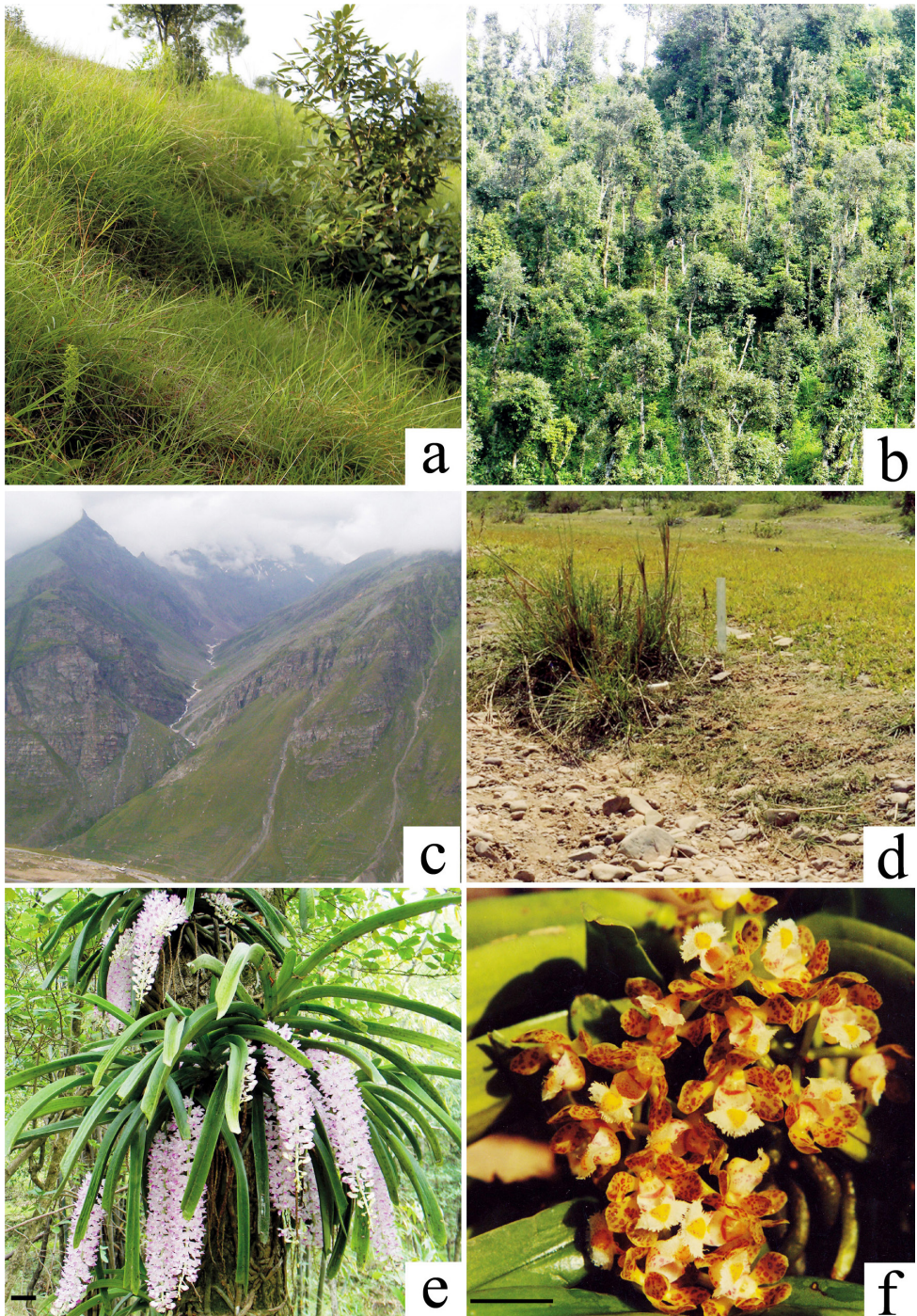


Figure 2. a–d. Main habitat types in the study area. a – Low hill grassy slope in Himachal Pradesh; b – Mid hill oak forest patch; c – High altitude habitat above the tree line; d – Riverside grassy habitat in the plains of Punjab. e–f. Some epiphytic orchids of the study area. e – *Rhynchostylis retusa*; f – *Gastrochilus calceolaris*. Scale bars (e–f)=2 cm.

Habenaria is the largest genus (eleven species) in Himachal Pradesh; it is followed by *Herminium* (nine species), *Calanthe*, *Eulophia* and *Neottia* (five species each). Twenty-three genera are represented with a single species each. In the adjoining plains, *Eulophia* is the largest genus with four species.

POWO (2026) treats *Eulophia hormusjii* Duthie as a synonym of *Eulophia dabia* (D. Don) Hochr. Though both of these taxa are closely allied, they exhibit some distinct characteristic features. Inflorescence is lax or dense in *E. dabia*, and labellum mid-lobe is never bright yellow (Fig. 3c). In contrast, the inflorescence is compact with densely arranged flowers, and mid lobe of the lip is always distinctly bright yellow in *E. hormusjii* (Fig. 3d). These species differ in their distribution range and flowering period also. *E. dabia* occur in the plains and Himalayan foot hills (300–600 m), and flower during February–March. *E. hormusjii*, on the other hand, occur in the plains (350 m) but ascends up to mid Himalayan regions (1800 m); it blooms comparatively late during April. Though we have not found this taxon at low altitude habitats of study area, but there is a report of its occurrence at 350 m from Uttarakhand by Jalal et al. (2006). Therefore, *Eulophia hormusjii* has been treated as an independent species in this checklist.

In what follows, an updated checklist of orchids of Himachal Pradesh and the adjoining plains is provided in alphabetical order (Suppl. materials 1: Table 1).

Threats to orchids in study area and conservation

Destruction, degradation and fragmentation of natural habitats owing mainly to factors like deforestation (to meet increased housing requirements, expansion of agricultural and horticultural fields, highway expansion and widening, excessive mining operations, raising hydro-power projects, etc.), Himalayan cloudbursts, overgrazing, plastic littering and dumping in forest floors, unregulated tourism, etc. are posing threat to natural populations and pushing many orchid species towards scarcity. Some of the commercially important species already face high collections pressures (Kant et al. 2012; Ghai et al. 2021). As seed germination in orchids is extremely low for want of a suitable fungal associate, it affects the process of population increment in nature. Additionally, pollination related intricacies and inherently slow growing nature also limit regeneration performance in orchids (Kant, Verma 2012). Therefore, protection of natural habitats and maintaining their original character is crucial for effective conservation of species. The commercially viable Himalayan species, on the other hand, could be mass propagated in vitro (symbiotic/asymbiotic culturing) to meet the requirements of industry in a sustainable manner (Bhatti et al. 2016; Dhillon, Pathak 2023). This will also aid relieving their wild populations from the burden of excessive collections.

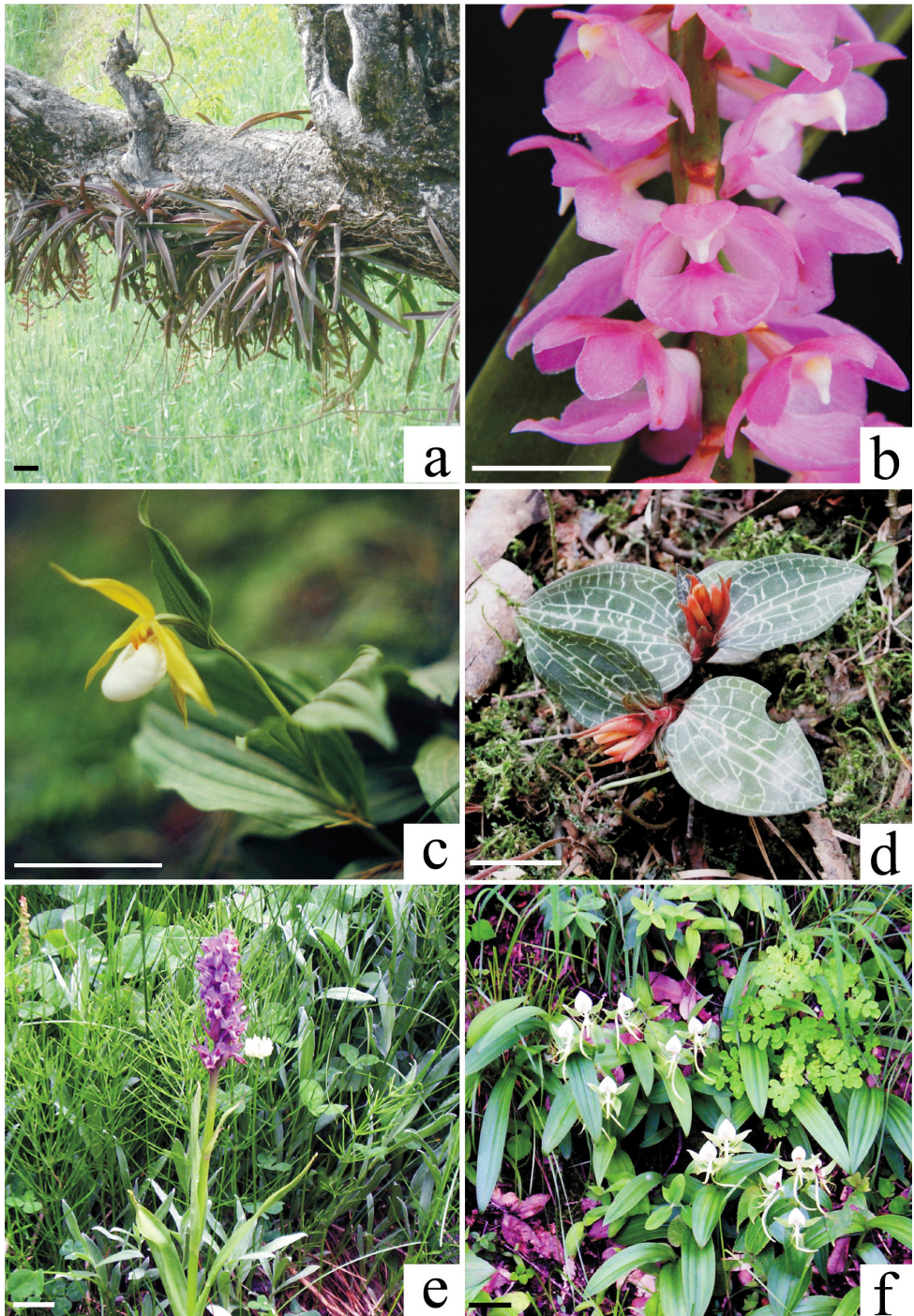


Figure 3. a–b. Some epiphytic orchids of the study area. a – A population of *Aerides multiflora*; b – Close-up of inflorescence. c–f. Some terrestrial orchids of the study area. c – *Cypripedium cordigerum*; d – *Goodyera biflora*; e – *Dactylorhiza hatagirea*; f – *Habenaria intermedia*. Scale bars (a–f)=2cm.

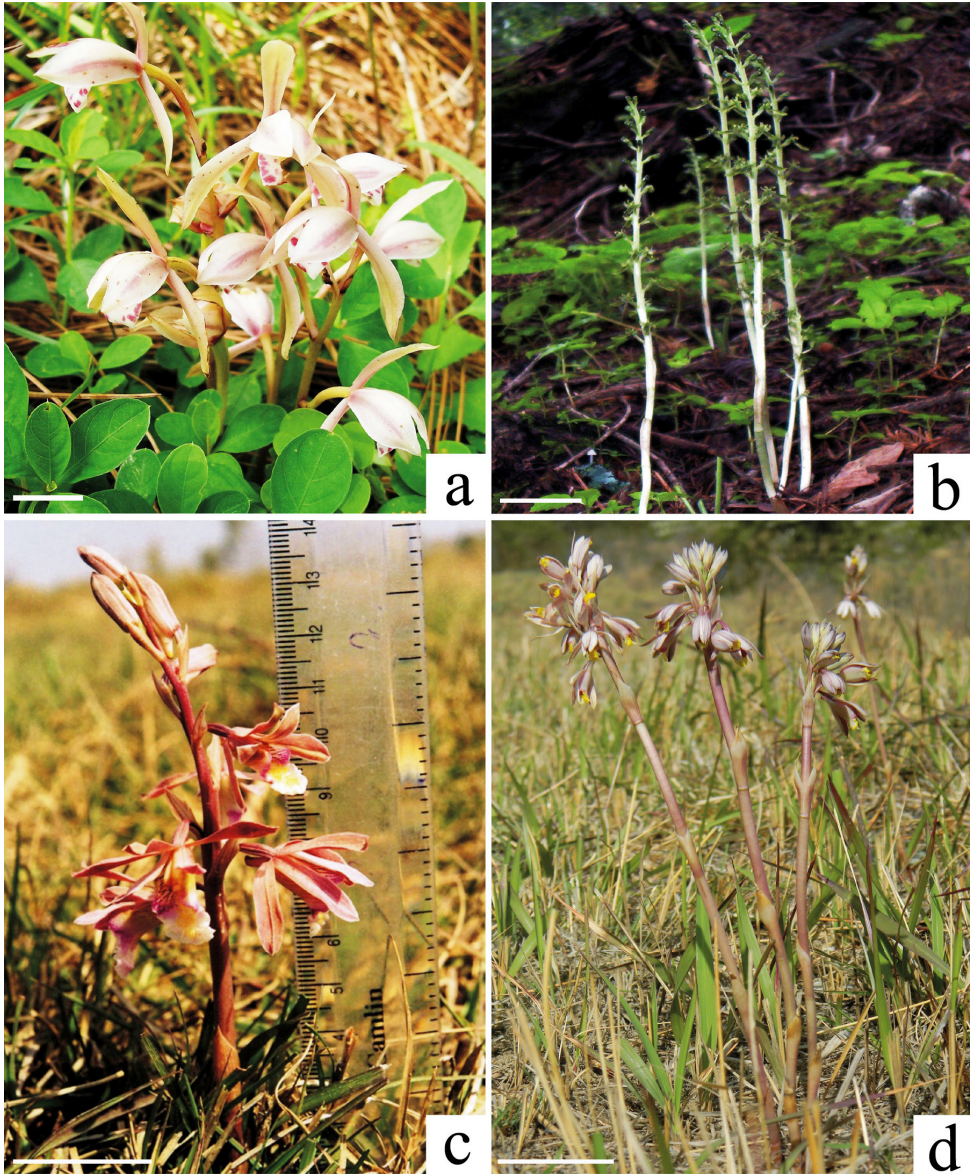


Figure 4. a–b. Some leaf-less mycoheterotrophic orchids of the study area. a – *Cymbidium macrorhizon*; b – *Neottia listeroides*; c–d. Two closely allied species of genus *Eulophia*. c – *Eulophia dabia* (note laxly arranged flowers); d – *Eulophia hormusjii* (note compact inflorescence and yellow colour of lip mid-lobe). Scale bars (a–d)=2cm.

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Supplementary material 1

Table 1. An updated checklist of orchids of Himachal Pradesh and the adjoining plains

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Data type: table

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