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Caption: *Cyrtodactylus myntkyawthurai*, endemic to Myanmar. Medium: Water colours on watercolor sheet. © Aakanksha Komanduri



A floristic survey across three coniferous forests of Kashmir Himalaya, India – a checklist

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Abstract: This study presents a checklist of the flora of three coniferous forests of the Himalayan biodiversity hotspot in Kashmir: low-level blue pine (BP), mixed coniferous (MC) and subalpine (SA) forests. The list includes altitudinal distribution and conservation status of 272 vascular plant species representing 196 genera and 64 families. Excluding neophytes (70 taxa, 62 genera, and 27 families), Magnoliophyta comprised 190 taxa, 139 genera, and 50 families; Pinophyta seven taxa, six genera, and three families; and Pteridophyta three taxa, three genera, and two families. Most speciose families from Magnoliophyta include Compositae, Apiaceae, and Rosaceae. Genera such as *Artemisia*, *Potentilla*, *Viola*, and *Saussurea* contributed the maximum number of species. In case of Pinophyta, the principal families are Pinaceae with four taxa followed by Cupressaceae (2 taxa), whereas genus *Juniperus* comprised two species. In Pteridophyta, Pteridaceae (2 taxa) formed the most speciose family. The herbs contributed 177 taxa, followed by tress (15 taxa), shrubs (8) and subshrubs (2). The maximum number of taxa belongs to SA (136 taxa) followed by MC (134 taxa) and BP (83 taxa) forests. The species distribution reveals 20, 30, and 46 taxa are exclusive to BP, MC, and SA forests. More than 16% of taxa are categorized in the International Union for Conservation of Nature (IUCN) Red List, and 24 taxa are endemic to the Himalayan landscape. The checklist provides a roadmap for research, protection and conservation of plant diversity, especially the threatened taxa.

Keywords: Compositae, coniferous forest, conservation, elevation, floristic survey, hotspot, Kashmir Himalaya, mountains, threatened taxa.

Abbreviations: Afg.—Afghanistan | Ah—Annual herb | APG—Angiosperm Phylogeny Group | Bh—Biennial herb | BP—Low-level blue pine forest | C—Central | CBD—Convention on Biological Diversity | CR—Critically Endangered | DD—Data Deficient | DS—Deciduous shrub | DT—Deciduous tree | E—Eastern | EC—Eastern-central | EN—Endangered | ES—Evergreen shrub | ET—Evergreen tree | IHR—Indian Himalayan Region | IUCN—International Union for Conservation of Nature | LC—Least Concern | MC—Mixed coniferous forest | Medit.—Mediterranean | Mya.—Myanmar | N—Northern | NA—Not assessed | NC—North-central | NE—North-eastern | NW—North-western | OER—Observed elevation range | Pak.—Pakistan | Ph—Perennial herb | Phip.—Philippines | S = Southern | S—Shrub | SA—Subalpine forest | SC—South-central | SE—South-eastern | SS—Subshrub | SW—South-western | Temp.—Temperate | Thail.—Thailand | TPL—The Plant List | VU—Vulnerable | W—Western.

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Author details: ASHAQ AHMAD DAR is a research scholar/junior research fellow. His areas of interest are forest ecology and plant taxonomy. DR. AKHTAR HUSSAIN MALIK, junior scientist, works in the field of plant taxonomy, biodiversity, and ethnobotany. N. PARTHASARATHY, professor, has expertise in forest ecology, biodiversity conservation, and plant taxonomy.

Author contributions: AAD carried out the fieldwork, gathered, processed & stored the specimens, and prepared the manuscript. AHM identified the plant specimens. NP directed the work and examined the manuscript.

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INTRODUCTION

Research on biodiversity became an essential aspect of biological research immediately after the Convention on Biological Diversity (CBD), with the goal of determining the implications of rapid depletion, management and climate change on species composition and diversity. Biodiversity-related data provide a foundation for species conservation and habitat protection (Cadotte 2006). With only 2.2% of global land area, India houses over 18,000 plant species, including 5,000 endemic flora, and is recognized among the 17 global mega-biodiverse countries (Nayar 1996; Singh et al. 2015). About half of the biodiversity hotspots representing 25% of the known biota are reported from mountain ecosystems (Wester et al. 2019). However, until recently, mountains acquired the attention of researchers, policy-makers, and conservationists.

Currently, diverse habitats supporting distinct flora are experiencing the threat of destruction due to fragmentation, rapid human population growth and climate change (Janssen et al. 2016; IUCN 2017). Consistent reductions in plant diversity call for continuous exploration of the population status of flora using systematic (IUCN) criteria, as this is acknowledged as the most rigorous strategy/technique for evaluating the global status of biodiversity and categorizing plants based on their projected risk of extinction (Maes et al. 2015; Orsenigo et al. 2018; Nowak et al. 2020).

The Himalaya, extending from Afghanistan to Myanmar, is one of 36 biodiversity hotspots harbouring a diverse range of flora and fauna, resulting from the phytogeographical complexity of the region (Zachos & Habel 2011). About half of the known biodiversity in India, particularly endemics, is contributed by the 13% land area of the Indian Himalayan Region (IHR). The phytogeographical complexity in the present Jammu & Kashmir, located on the northwestern side of the Himalaya, contributes significantly to various life forms. On account of its floristic status, the Kashmir Himalaya is a part of Himalayan biodiversity hotspot, and it is also considered to be vulnerable to climate change and thus species extinction (Rashid et al. 2015).

Several scholars over the course of time have made significant contributions to floristic knowledge of the Himalayan region: Hooker (1872–1897); Lambert (1933); Javeid (1966, 1978, 1979); Hajra (1983); Polunin & Stainton (1984); Kachroo (1993); Singh & Kachroo (1994); and Malik et al. (2010). However, critical taxonomic knowledge about the Kashmir Himalaya is still poor. In addition, a detailed study on the altitudinal

distribution of taxa across the forest types is lacking. Consequently, the present study was undertaken to document the floristic diversity of the area, and to highlight its conservation significance.

MATERIALS AND METHODS

Study area

The study area spans over five districts of the Kashmir valley (33.513–34.659 °N & 74.497–75.019 °E) in the present Jammu & Kashmir, India (Figure 1; Image1). Kashmir valley exhibits a warm summer and humid continental climate (Dfa; Peel et al. 2007) with four distinctive seasons, i.e., spring, summer, autumn, and winter. Climate data from the last 38 years revealed that Kashmir valley experiences an annual mean minimum and maximum temperature of 5.4 ± 0.4 °C and 17.6 ± 0.8 °C (Dad et al. 2021). Furthermore, the mean annual rainfall is 1005.5 ± 197.6 mm (Dad et al. 2021). About 46% of precipitation occurs during pre-monsoon, followed by south-west monsoon (27%), winter monsoon (25%), and post-monsoon (8%). Disturbances posed by the Mediterranean Sea during winter lead to frequent rain and snowfall in the valley. The period of snowfall extends from October–March. Geologically, the study area consists of rocks chiefly composed of slates, phyllites and quartzites (Krishnan 1982). The predominant soil orders are entisols, inceptisols, alfisols, and mollisols (Mahapatra et al. 2000; Sidhu & Surya 2014).

Low-level blue pine (BP) forest ranges from 1,500–2,400 m on gentle to moderate slopes. Even-aged stands of the blue-pine, *Pinus wallichiana* A.B.Jacks intermixed with deodar, *Cedrus deodara* (Roxb. ex D.Don) G.Don and the spruce, *Picea smithiana* (Wall.) Boiss., occur depending upon the aspect. Since the ground surface is covered with litter, understory herb vegetation is less comprising of *Poa alpina* L., *Fragaria nubicola* (Lindl. ex Hook.f.) Lacaita, *Viola canescens* Wall. in summer season (Shaheen et al. 2012). Dominant shrub species include *Viburnum grandiflorum* Wall. ex DC., *Berberis lycium* Royle, *Indigofera heterantha* Brandis depending upon aspect and canopy cover. Anthropogenic disturbances include land encroachment (for cultivating *Zea mays* L. and *Solanum tuberosum* L.), non-timber forest product extraction (fruits of *Viburnum grandiflorum* Wall. ex DC., medicinally important herbs, honey, nutritious and medicinally important fungus – *Morchella esculenta* (L.) Pers. etc.), lopping, firewood collection, grazing, and fire.

Mixed coniferous (MC) forest, commonly referred to

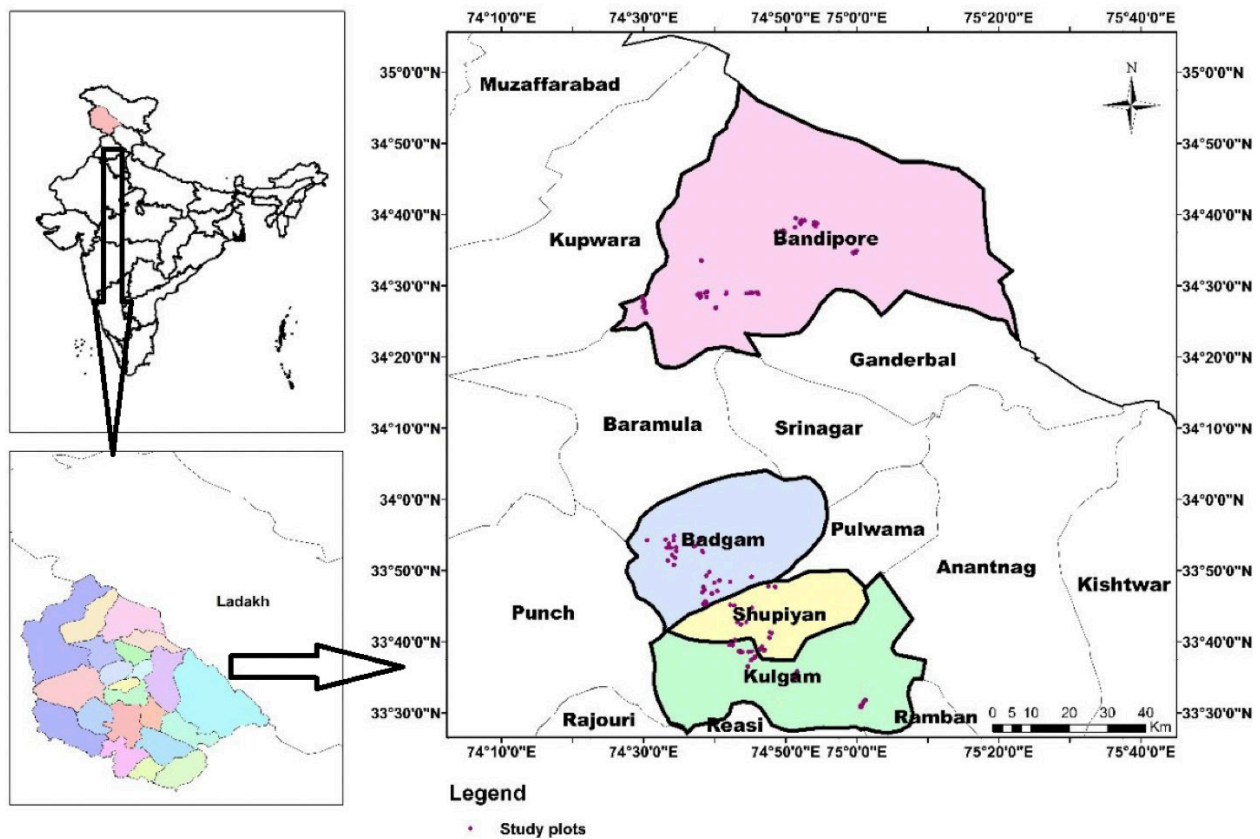


Table 1. Map of India, Jammu and Kashmir state, four districts shown in different colours, and the sampled locations in red dots.

as fir forest, occupies the central and western Himalaya from an elevation of about 2,400–3,000 m. Tree species such as evergreen coniferous (*Abies pindrow* (Royle ex D. Don) Royle, *Picea smithiana* and *Pinus wallichiana*) and deciduous broad-leaved tree species (*Acer caesium* Wall. ex Brandis, and *Prunus cornuta* (Wall. ex Royle) Steud.) predominate. The regeneration of tree species is low or absent, as indicated by the presence of few saplings and seedlings. Understorey vegetation blossoms after the snowmelt during the spring season and is quite dense and diverse. The dominant shrub and herb species include *Viburnum grandiflorum* and *Stipa sibirica* (L.) Lam., (Dar & Sundarapandian 2016). Epiphytic moss and lichen cover the trunk and lower branches of emergent tree species. Activities such as grazing, extraction of plants and plant materials of economic and medicinal value, firewood collection, illegal logging, etc., contribute to forest degradation.

The subalpine forest (SA) forms a transition between MC forest and alpine scrub or grassland from 2,900–3,500 m. *Abies pindrow* is a characteristic and dominant species intermixed with *Betula utilis* D. Don. *Rhododendron* spp. occur as undergrowth or

form individual stands. The species of Primulaceae, Ranunculaceae, and Compositae constitute the main understory herbaceous vegetation. The subalpine forest is equally subjected to anthropogenic disturbances like the other forest types besides heavy winter snowfall as a natural disturbance (Gairola et al. 2009).

Sampling, herbarium preparation, and data analysis

A reconnaissance floristic survey was undertaken in the landscape between the elevation gradient of 1,500 m and 3,800 m to understand the forest types and composition. Three coniferous forests of Kashmir Himalaya: BP, MC, and SA (Champion & Seth 1968) were identified in the region. Botanical explorations were undertaken during 2019 (March–July) and 2020 (May–August) by employing a random sampling approach considering the accessibility and forest types. During the survey, plants such as trees, shrubs and herbs were documented and voucher specimens were collected. Specimens were processed (pressing, drying, chemical treatment, and mounting) following recommended standard techniques (Rao & Sharma 1990), and examined and identified at the Centre for Biodiversity

and Taxonomy, University of Kashmir. The voucher specimens were deposited at the Department of Ecology and Environmental Sciences Herbarium, Pondicherry University. The Plant List (TPL; <http://www.theplantlist.org/>) was referred for updated binomial nomenclature and the author names. Angiosperm Phylogeny Group III (APG III) Classification (2009) and Chase & Reveal (2009) for angiosperms and Gymnosperms were followed for categorizing families. Khuroo et al. (2007) was referred for the origin and alien status of flora. Various information sources were explored to acquire Himalayan and global records of inventoried taxa, including Himalayan flora literature (Hooker 1872–1897; Polunin & Stainton 1984), Tropicos (<http://www.tropicos.org/>), India Biodiversity Portal (<https://indiabiodiversity.org/>), Flowers of India (<http://www.flowersofindia.net/>) and Plants of the World online (<http://www.plantsoftheworldonline.org/>).

RESULTS

Species composition and distribution

A total of 272 taxa belonging to 196 genera and 64 families were recorded across the three Kashmir Himalayan coniferous forests (Table 1). Of the total vascular plants, neophytes (aliens) represent 70 (25.73%) taxa within 27 and 62 families and genera (Table 2). This includes invasive aliens (IA; 51.42%), naturalised aliens (NZ; 38.57%), casual/naturalised aliens (C/NA; 8.57%) and cultivated unescaped aliens (CU; 1.43%). Among the aliens, woody flora accounted five (7.14%) species (*Robinia pseudoacacia* L., *Syringa emodi* Wall. ex Royle, *Crataegus songarica* K. Koch, *Rosa brunonii* Lindl., *Aesculus indica* (Wall. ex Cambess.) Hook.). All the neophytes are excluded hereafter from further analysis.

Most of the native taxa belong to Magnoliophyta (192 taxa, 139 genera, and 50 families), whereas Pinophyta (seven taxa, six genera, and three families) and Pteridophyta (three taxa, three genera, and two families) are less represented (Table 2). Within Magnoliophyta, 177 taxa (92%) belong to Magnoliopsida

and 15 (7.8%) to Liliopsida. Among these, there are 177 herb taxa (174 Magnoliophyta and three Pteridophyta), eight shrub taxa (Magnoliophyta only), 15 tree taxa (eight Magnoliophyta and seven Pinophyta) and two subshrubs (Magnoliophyta only). Herbs are dominated by perennials (150 taxa, 85%), followed by annuals (17 taxa, 9.6%), biennials (two taxa, 1.1%) and evergreen (one taxon, 0.56%). Moreover, seven (3.9%) herbaceous taxa are either perennials, annuals or biennials (Table 2). Of the 15 reported tree taxa, most of them are deciduous (8, 59%), followed by evergreen conifers (seven, 41%). Similarly, among the shrubs, seven (88%) are deciduous (including one climber), and one (12.5%) is evergreen. The images of selected plant taxa are provided (Images 2–7).

Three families in Magnoliophyta with greater contribution to species richness include Compositae (28 taxa, 13.86%) and Apiaceae and Rosaceae (13, 6.44% each). Families with ten or more species (besides above three) include Lamiaceae, Leguminosae, Poaceae (11, 5.45% each), and Ranunculaceae (10, 4.95%) (Figure 2). Species-rich genera, i.e., *Artemisia*, *Potentilla*, *Viola*, and *Saussurea* contributed 16 (7.92%) taxa. Majority of families (26, 47.27%) and genera (108, 72.97%) are monotypic with a single taxon. Among Pinophyta, Pinaceae (four taxa) and Cupressaceae (two taxa) are predominant families, whereas *Juniperus* is the principal genus contributing two taxa. Pteridophyta is represented by Pteridaceae (two taxa) and Equisetaceae (one taxon), and all the three genera (*Adiantum*, *Equisetum*, and *Pteris*) contributed equally, i.e., one species. In contrast to tree and understory herb vegetation, all shrub families and genera contributed one species each.

The number of taxa varied among the forest types and corresponding elevation due to the uneven distribution of taxa (Table 1). The SA and MC forests represent greater number of taxa, i.e., 136 and 134, followed by BP forest (83 taxa). The species distribution revealed that 20 taxa are exclusive to BP forest, whereas 30 and 46 taxa are limited to MC and SA forests. However, 22.77% of taxa with a wide distributional range are shared among forest types. Furthermore, BP & MC, BP & SA, and MC

Table 1. Distribution of taxa among various taxonomic groups in three coniferous forests viz., low-level blue pine forest (BP), mixed coniferous forest (MC), subalpine forest (SA) of Kashmir Himalaya, India.

Phylum	Taxon	Genera	Family	Trees	Shrubs	Subshrub	Herbs
Magnoliophyta	262	187	59	10	10	3	239
Pinophyta	7	6	3	7	–	–	–
Pteridophyta	3	3	2	–	–	–	3
Total	272	196	64	17	10	3	242

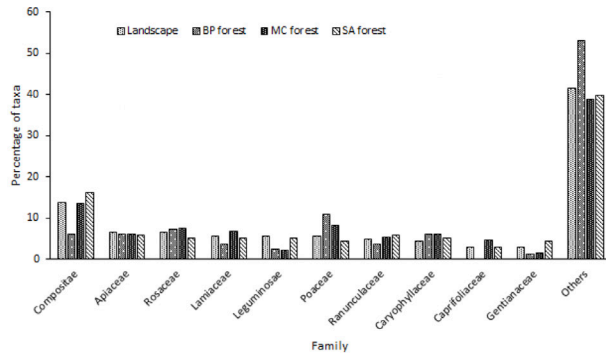


Figure 2. Percentage contribution to taxa across three coniferous forests of Kashmir Himalaya, India by families.

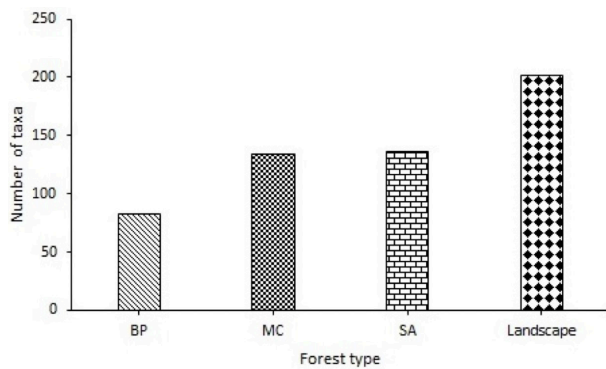


Figure 3. Number of taxa in three coniferous forests of Kashmir Himalaya, India.

& SA forests shared 16, two, and 43 taxa, respectively. The SA forest harbours greater number of species of Compositae (16.18%) and Caryophyllaceae (5.15%) than to landscape-scale flora (13.86% and 4.46%) in top 10 families. Similarly, Poaceae, and Rosaceae in BP (10.84% & 7.23%) and MC forests (8.21% & 7.46%) contributed greater number of taxa than to the overall landscape (5.45% & 6.44%).

Determination of phytogeographic distribution and taxa status

The distribution of most of the recorded taxa is confined to the northern temperate regions. However, 24 taxa restricted their distribution to the Himalayan landscape (Table 2). Despite the considerable research on plant conservation in Kashmir Himalaya, the analysis of the conservation status of the flora revealed that 169 taxa are not assessed (NA), and the remaining 33 (16.37%) taxa are included under IUCN Red List category (Table 2). Among them, two species *Saussurea costus* (Falc.) Lipsch. and *Aconitum chasmanthum* Stapf ex Holmes are Critically Endangered (CR); four

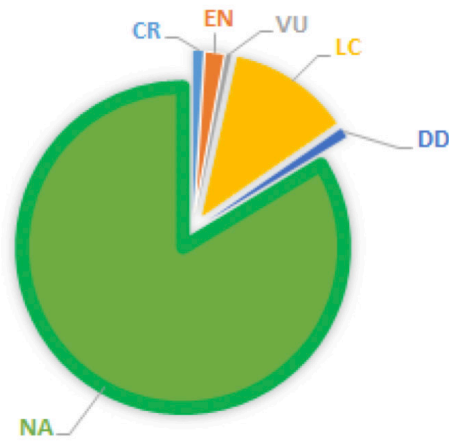


Figure 4. Pie-chart showing IUCN category of species across the three coniferous forests of Kashmir Himalaya, India.

species *Trillium govianianum* Wall. ex D.Don, *Aconitum heterophyllum* Wall. ex Royle, *Taxus wallichiana* Zucc. and *Atropa acuminata* Royle ex Lindl. are Endangered (EN); one species *Cypripedium cordigerum* D.Don is Vulnerable (VU), two species *Asparagus filicinus* Buch-Ham. ex D.Don and *Corylus jacquemontii* Decne. fall under Data Deficient (DD) category and 24 species are Least Concern (LC). With regard to the forest type and vertical distribution, the maximum number of threatened taxa (VU+EN+CR) occur in SA forest at high altitudinal zones.

DISCUSSION

The floristic survey revealed 272 taxa from 196 genera and 64 families categorized in three life-forms, i.e., trees and understorey shrubs and herbs (Table 1 & 2). The number of taxa reported in the present study was greater than most of the floristic studies in temperate Kashmir Himalaya (Shaheen et al. 2012; Mir et al. 2019; Malik et al. 2021) and other Himalayan studies (Ahmad et al. 2020; Asif et al. 2020; Tiwari et al. 2020) and also elsewhere (Bai et al. 2011). Compositae and Apiaceae constituted species-rich families in this survey. These families were also well represented in other studies of the Kashmir Himalaya: Asif et al. (2020) *Betula* forests in northwestern Kashmir Himalaya; Dar & Sundarapandian (2016) forests of western Himalaya, and elsewhere Devi et al. (2014) northwestern Himalaya. Variation in species distribution among the forest types/altitudinal zones could be due to micro-climatic heterogeneity resulting from a change in elevation, slope, and other ecological gradients (Körner 2007), besides evolutionary

Table 2. List of plant species in three temperate coniferous forests, viz., low-level blue pine forest (BP), mixed coniferous forest (MC), subalpine forest (SA) of Kashmir Himalaya, India.

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
Acanthaceae					
<i>Pteracanthus alatus</i> (Nees) Bremek. ¹	Erect S	BP	2200–2300	PU/EES/KH-1210	E. Afg. to S. China, N. Indo-China & Taiwan
Adoxaceae					
<i>Sambucus wightiana</i> Wall. ex Wight & Arn. ^{1*}	Erect Ph	BP/MC/SA	2200–3310	PU/EES/KH-15201	India, Pak., W. Himalayas
<i>Viburnum grandiflorum</i> Wall. ex DC. ¹	DS	BP/MC/SA	1890–3000	PU/EES/KH-1206	Himalayas from Kashmir to SE Tibet
Amaranthaceae					
<i>Achyranthes aspera</i> L. ^{1*}	Ph	MC/SA	2600–3000	PU/EES/KH-15001	Tropical & Subtropical Old World; throughout India
<i>Chenopodium album</i> L. ^{1*}	Ah	MC/SA	2650–2990	PU/EES/KH-15065	Temp. Eurasia to Indian Subcontinent
<i>Chenopodium foliosum</i> Asch. ^{1*}	Ah or Ph	SA	2910–3160	PU/EES/KH-15066	C. & S. Europe to Nepal; W. Himalayas in India
Amaryllidaceae					
<i>Allium humile</i> Kunth ¹	Bulbous Ph	MC/SA	2700–3015	PU/EES/KH-15013	N. Pak. to C. Himalayas & China
Apiaceae					
<i>Aegopodium alpestre</i> Ledeb. ¹	Ph	MC	2500–2600	PU/EES/KH-15008	Temp. Asia; W. Himalayas in India
<i>Bunium cylindricum</i> (Boiss. & Hohen.) Drude ¹	Ph	SA	3100–3150	PU/EES/KH-15045	Turkey to C. Asia & Pak. to W. Himalayas
<i>Bupleurum falcatum</i> L. ¹	Ph	BP	2200–2300	PU/EES/KH-15046	Europe to Himalayas
<i>Bupleurum longicaule</i> Wall. ex DC. ¹	Ph	SA	3750–3800	PU/EES/KH-15047	Himalayas from Pak. to Bhutan
<i>Carum carvi</i> L. ¹	Ph	BP	2350–2400	PU/EES/KH-15054	Palaearctic region; throughout India
<i>Chaerophyllum reflexum</i> Aitch. ¹	Ph	BP/MC	1927–2450	PU/EES/KH-15063	Himalayas from Pak. to SW China
<i>Chaerophyllum villosum</i> Wall. ex DC. ¹	Ph	BP/MC/SA	2050–2920	PU/EES/KH-15064	N. Pak. to China; Himalayas in India
<i>Eryngium billardieri</i> Delile ^{1*}	Ph	BP	2120–2130	PU/EES/KH-15103	EC Turkey to Lebanon & W. Pak.; W. Himalayas in India
<i>Heracleum candicans</i> Wall. ex DC. ¹	Climbing Ph	MC/SA	2400–3810	PU/EES/KH-15119	Himalayas from Pak. to SW China
<i>Pimpinella acuminata</i> (Edgew.) C.B. Clarke ¹	Ph	BP/MC/SA	2200–3120	PU/EES/KH-15170	N. Pak. to China; Himalayas in India
<i>Pimpinella diversifolia</i> DC. ¹	Ph	MC	2460–2770	PU/EES/KH-15171	E. Afg. to China & Indo-China; Himalayas in India
<i>Prangos pabularia</i> Lindl. ¹	Ph	MC/SA	2720–3140	PU/EES/KH-15189	Turkey to C. Asia & W. Himalayas
<i>Sanicula elata</i> Buch.-Ham. ex D.Don ¹	Ph	SA	2910–2930	PU/EES/KH-15202	SE Asia from Pak. to W. China & S. Japan to SE Africa
<i>Scandix pecten-veneris</i> L. ^{1*}	Tall robust Ph	SA	3300–3310	PU/EES/KH-15207	Europe to NW India
<i>Selinum vaginatum</i> C.B. Clarke ¹	Ph	SA	3790–3800	PU/EES/KH-15211	NE Pak. to W. Himalayas
<i>Seseli libanotis</i> (L.) W.D.J.Koch ¹	Ph	MC/SA	2740–2920	PU/EES/KH-15214	Europe, Turkey, Iran, W. Pak. & India
Apocynaceae					
<i>Vincetoxicum hirundinaria</i> Medik. ¹	Prostrate erect or climbing Ah	BP/MC	1980–2760	PU/EES/KH-15244	Europe to W. Siberia & N. Turkey, NW Africa, Himalayas
Araceae					
<i>Arisaema jacquemontii</i> Blume ²	Rhizomatous Ph	BP/MC/SA	2250–2950	PU/EES/KH-15028	Afg. to Mya.
<i>Arisaema propinquum</i> Schott ¹	Ph	MC/SA	2450–2950	PU/EES/KH-15029	Pak. to Himalayas & Tibet
Araliaceae					
<i>Hedera nepalensis</i> K.Koch ¹	Ph	BP/MC	1980–2610	PU/EES/KH-15118	Afg. to Thail.; Himalayas in India

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
Asparagaceae					
<i>Asparagus filicinus</i> Buch.-Ham. ex D.Don ⁴	Erect or twining Ph	BP	1800–1900	PU/EES/KH-15036	Himalayas to C. China
<i>Polygonatum multiflorum</i> (L.) All. ¹	Tufted Ah	BP/MC	2270–2440	PU/EES/KH-15181	Eurasia; W. Himalayas in India
<i>Polygonatum verticillatum</i> (L.) All. ¹	Rhizomatous Ph	BP/MC/SA	1980–3120	PU/EES/KH-15183	Europe to China; Himalayas in India
Balsaminaceae					
<i>Impatiens brachycentra</i> Kar. & Kir. ¹	Ph	BP/MC/SA	2120–3310	PU/EES/KH-15122	Afg. to C. Asia & W. Himalayas
Berberidaceae					
<i>Berberis lycium</i> Royle ¹	Semi-DS	BP	2100–2150	PU/EES/KH-1203	W. Himalayas from Pak. to Nepal
<i>Epimedium elatum</i> C.Morren & Decne. ¹	Rhizomatous Ph	MC/SA	2520–3120	PU/EES/KH-15095	N. Pak. to W. Himalayas
<i>Podophyllum hexandrum</i> Royle ¹	Rhizomatous Ph	BP/MC/SA	2370–3310	PU/EES/KH-15176	NE Afg. to C. China; Himalayas in India
Betulaceae					
<i>Betula utilis</i> D.Don ²	DT	SA	2910–3300	PU/EES/KH-1004	Afg. to N. & C. China; Himalayas in India
<i>Corylus jacquemontii</i> Decne. ⁴	DT	MC	2560–2790	PU/EES/KH-1006	Europe, Himalayas from Afg. to W. Nepal
Boraginaceae					
<i>Arnebia benthamii</i> (Wall. ex G. Don) I.M. Johnst. ¹	Rhizomatous Ph	SA	3800–3900	PU/EES/KH-15024	NE Pakistan to W. & C. Himalaya
<i>Cynoglossum glochidiatum</i> Wall. ex Benth. ¹	Bh	BP/MC/SA	2120–3000	PU/EES/KH-15084	Afg. through Kashmir to Sikkim & W. China
<i>Cynoglossum lanceolatum</i> Forssk. ^{1*}	Bh or Ph	BP/SA	2230–3800	PU/EES/KH-15085	Tropical & S. Africa to Tropical & Subtropical Asia; throughout India
<i>Hackelia uncinata</i> (Benth.) C.E.C.Fisch ¹	Ph	SA	2910–3120	PU/EES/KH-15117	Himalayas from Pak. to SW China
<i>Myosotis alpestris</i> F.W. Schmidt ¹	Ph	SA	3150–3310	PU/EES/KH-15148	Europe, Himalayas from Pak. to Bhutan
<i>Myosotis sylvatica</i> Ehrh. ex Hoffm. ¹	Ph	BP/MC/SA	2260–3150	PU/EES/KH-15149	Temp. Eurasia; W. Himalayas in India
Brassicaceae					
<i>Arabis amplexicaulis</i> Edgew. ¹	Ph	BP/MC	2200–2410	PU/EES/KH-15021	Afg. to Mongolia & Himalayas
<i>Arabis pterosperma</i> Edgew. ¹	Ph	MC	2700–2800	PU/EES/KH-15023	Kashmir to China
<i>Capsella bursa-pastoris</i> (L.) Medik. ^{1*}	Erect Ah or Bh	MC/SA	2420–2950	PU/EES/KH-15053	Temp. Eurasia, N. Africa; throughout India
<i>Chorispora tenella</i> (Pall.) DC. ¹	Ah	MC	2750–2770	PU/EES/KH-15067	SE & E. Europe to China; W. Himalayas in India
<i>Lepidium apetalum</i> Willd. ¹	Rhizomatous Ph	BP	2120–2130	PU/EES/KH-15134	E. Europe to temp. Asia; Himalayas in India
<i>Turritis glabra</i> L. ^{1*}	Ah or Bh	BP/MC	2300–2650	PU/EES/KH-15022	Temp. N. Hemisphere; W. Himalayas in India
Campanulaceae					
<i>Campanula cashmeriana</i> Royle ¹	Ph	SA	3150–3200	PU/EES/KH-15050	Afg. to W. Himalayas to Nepal
<i>Campanula latifolia</i> L. ¹	Ph	MC/SA	2525–2920	PU/EES/KH-15051	SW Siberia, W. Asia to C. Himalayas
<i>Codonopsis ovata</i> Benth. ¹	Ph	MC/SA	2720–3800	PU/EES/KH-15076	C. Asia, Himalayas from Pak. to Kashmir
<i>Codonopsis rotundifolia</i> Benth. ¹	Twining Ph	BP	2200–2340	PU/EES/KH-15077	Pak. to Himalayas & S. Tibet
Cannabaceae					
<i>Cannabis sativa</i> L. ^{1*}	Ah	BP/MC	1920–2650	PU/EES/KH-15052	Native to C. Asia now cosmopolitan
Caprifoliaceae					
<i>Dipsacus inermis</i> Wall. ¹	Ph	MC/SA	2700–3810	PU/EES/KH-15092	Himalayas from Afg. to SW China & Mya.
<i>Lonicera quinquelocularis</i> Hard. ¹	ES	MC	2500–2700	PU/EES/KH-1209	E. Afg. to Himalayas
<i>Morina longifolia</i> Wall. ¹	Ph	MC/SA	2700–2920	PU/EES/KH-15147	N. Pakistan to Himalaya & S. Tibet

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
<i>Scabiosa speciosa</i> Royle ¹	Ah	MC	2720–2730	PU/EES/KH-15208	Himalayas from Pak. to Uttarakhand
<i>Valeriana hardwickii</i> Wall. ¹	Dioecious Ph	MC/SA	2570–3140	PU/EES/KH-15238	N. Pak. to S. China & W. Malesia, Himalayas in India
<i>Valeriana jatamansi</i> Jones ¹	Ph	MC/SA	2700–3150	PU/EES/KH-15239	Himalayas from Afg. to SW China
Caryophyllaceae					
<i>Arenaria orbiculata</i> Royle ex Edgew. & Hook.f. ¹	Ah	MC	2500–2600	PU/EES/KH-15026	Afg. to China; Himalayas in India
<i>Cerastium cerastoides</i> (L.) Britton ¹	Ph	BP/MC/SA	1920–3160	PU/EES/KH-15060	Temp. Eurasia, E. Canada to Greenland; W. Himalayas in India
<i>Cerastium dahuricum</i> Fisch. ¹	Scrambling Ph	BP/MC/SA	2520–3000	PU/EES/KH-15061	European Russia to Mongolia & W. Himalayas
<i>Cucubalus baccifer</i> L. ¹	Ph	BP/MC/SA	2400–2950	PU/EES/KH-15082	Temp. Eurasia & Himalayas
<i>Lepyrodiclis holosteoides</i> (C.A. Mey.) Fenzl ex Fisch. & C.A. Mey. ¹	Ah or Bh	MC/SA	2630–3120	PU/EES/KH-15135	Turkey to Mongolia & Himalayas
<i>Lychnis coronaria</i> Desr. ^{1*}	Ph	BP/MC	2070–2780	PU/EES/KH-15141	EC & SE Europe to N. Iran & C. Asia to W. Himalayas
<i>Silene himalayensis</i> (Rohrb.) Majumdar ¹	Ah	SA	2810–2820	PU/EES/KH-15218	NE Afg. to C. China; Himalayas in India
<i>Silene vulgaris</i> (Moench) Garcke ²	Ph	BP/MC/SA	2200–2920	PU/EES/KH-15219	Palaearctic; W. Himalayas in India
<i>Spergularia diandra</i> (Guss.) Heldr. ¹	Ph	MC	2700–2710	PU/EES/KH-15221	Canary Islands, Medit. to SW Siberia & N. China; W. Himalayas in India
<i>Stellaria decumbens</i> Edgew. ¹	Ph	BP/MC/SA	2200–3150	PU/EES/KH-15225	E. & NE Afg. to China; Himalayas in India
<i>Stellaria media</i> (L.) Vill. ^{1*}	Densely or laxly caespitose Ph	BP/MC	2250–2780	PU/EES/KH-15226	Temp. Eurasia, N. & NE Tropical Africa; throughout India
Compositae					
<i>Achillea millefolium</i> L. ^{2*}	Rhizomatous Ph	BP/MC/SA	2200–3800	PU/EES/KH-15002	Subarctic & temp. N. Hemisphere to Guatemala; W. Himalayas in India
<i>Anaphalis contorta</i> (D.Don) Hook.f. ¹	Rhizomatous under-S	BP/MC/SA	1900–3300	PU/EES/KH-15014	Himalayas from Afg. to SW China & Mya.
<i>Anaphalis stantonii</i> Georgiadou ¹	Ph	MC	2700–2800	PU/EES/KH-15015	N. Pak. to W. Himalayas
<i>Anaphalis virgata</i> Thomson ¹	Ph	BP/MC/SA	2200–3200	PU/EES/KH-15016	Afg. to Xinjiang & Himalayas
<i>Arctium lappa</i> L. ^{1*}	Bh	BP/SA	2300–2950	PU/EES/KH-15025	Temp. Eurasia; Himalayas in India
<i>Artemisia absinthium</i> L. ^{1*}	Ph	MC/SA	2750–2920	PU/EES/KH-15030	Europe to Siberia & W. Himalayas
<i>Artemisia brevifolia</i> Wall. ex DC. ¹	SS	MC	2450–2720	PU/EES/KH-15031	Afg. to W. Tibet & W. Himalayas
<i>Artemisia dubia</i> Wall. ¹	SS	BP	2300–2400	PU/EES/KH-15032	Himalayas from Pak. to C. Nepal & China
<i>Artemisia scoparia</i> Waldst. & Kitam. ¹	Bh or Ph	MC/SA	2450–3300	PU/EES/KH-15033	Palaearctic region; throughout India
<i>Artemisia vestita</i> Wall. ex Besser ^{1*}	SS	SA	3200–3400	PU/EES/KH-15034	Pak. to Mongolia & China, W. Himalayas in India
<i>Artemisia vulgaris</i> L. ¹	Ph	SA	2830–2916	PU/EES/KH-15035	Temp. Eurasia to Indo-China & N. Africa
<i>Carduus edelbergii</i> Rech.f. ^{1*}	Ph	BP/MC	2010–2550	PU/EES/KH-15056	Afg. to Nepal
<i>Carpesium abrotanoides</i> L. ^{1*}	Ph	BP/MC	2200–2570	PU/EES/KH-15057	S. & C. Europe to Japan & Himalayas
<i>Carpesium cernuum</i> L. ¹	Ah	MC/SA	2750–2930	PU/EES/KH-15055	Eurasia; W. Himalayas in India
<i>Centaurea iberica</i> Trevir. ^{1*}	Ph	BP	2250–2300	PU/EES/KH-15059	SE & E. Europe to Xinjiang & W. Himalayas
<i>Cichorium intybus</i> L. ^{1*}	Ph	BP/MC	2050–2490	PU/EES/KH-15068	N. Africa, C & SW Asia & Europe
<i>Cirsium arvense</i> (L.) Scop. ^{1*}	Dioecious Ph	BP	2200–2210	PU/EES/KH-15070	Temp. Eurasia, NW Africa; Himalayas in India
<i>Cirsium falconeri</i> (Hook.f.) Petr. ¹	Ph	SA	2840–2990	PU/EES/KH-15071	N. Pak. to S. Tibet & N. Mya.

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
<i>Cirsium vulgare</i> (Savi) Ten. ¹	Bh	SA	2940–2950	PU/EES/KH-15072	Europe to Siberia & Arabian Peninsula; W. Himalayas in India
<i>Cirsium wallichii</i> DC. ^{1*}	Ph	BP/MC/SA	1920–3210	PU/EES/KH-15073	Afg. to Indian Subcontinent
<i>Conyza canadensis</i> (L.) Cronquist ^{1*}	Ah	BP	2010–2210	PU/EES/KH-15079	Native to Neotropic & Nearctic regions
<i>Crepis sancta</i> (L.) Bornm. ^{1*}	Ah	SA	2910–2920	PU/EES/KH-15081	E. Europe, W. Asia eastwards in Himalayas up to Nepal
<i>Doronicum roylei</i> DC. ¹	Ph	SA	3800–3810	PU/EES/KH-15093	NE Pak. to Himalayas & S. Tibet
<i>Erigeron multiradiatus</i> (Lindl. ex DC.) Benth. ex C. B. Clarke ¹	Rhizomatous Ph	MC/SA	2530–3800	PU/EES/KH-15101	Afg. to China
<i>Lactuca macrorhiza</i> (Royle) Hook. f. ¹	Rhizomatous Ph	MC/SA	2570–3130	PU/EES/KH-15125	Afg. to Himalayas
<i>Lactuca dolichophylla</i> Kitam.¹	Ph	MC	2530–2540	PU/EES/KH-15126	Himalayas from Afg. to SW China
<i>Lapsana communis</i> L. ¹	Ah	BP/MC	2315–2710	PU/EES/KH-15129	Europe to Siberia & Iran; W. Himalayas in India
<i>Ligularia amplexicaulis</i> DC. ¹	Ph	MC/SA	2790–2930	PU/EES/KH-15137	Himalayas to S. Tibet
<i>Ligularia fischeri</i> (Ledeb.) Turcz. ¹	Ph	MC/SA	2570–3540	PU/EES/KH-15138	NE Pak. to S. Siberia & Japan; Himalayas in India
<i>Myriactis nepalensis</i> Less. ¹	Ph	BP/MC/SA	1980–3000	PU/EES/KH-15150	Himalayas from Afg. to SW China, & SE Asia
<i>Picris hieracioides</i> Sibth. & Sm. ¹	Ph	MC/SA	2430–3000	PU/EES/KH-15169	Temp. Eurasia; Himalayas in India
<i>Saussurea albescens</i> Hook. f & Thomson ¹	Ph	SA	3010–3020	PU/EES/KH-15203	NE Afg. to Nepal
<i>Saussurea costus</i> (Falc.) Lipsch.³	Ph	SA	3050–3060	PU/EES/KH-15206	W. Himalayas
<i>Saussurea roylei</i> C.B. Clarke¹	Ph	SA	3130–3140	PU/EES/KH-15204	NW Himalayas
<i>Saussurea taraxacifolia</i> (Lindl.) Wall. ex DC. ¹	Ph	SA	3800–3810	PU/EES/KH-15205	Himalayas from Kashmir to Bhutan, Xizang
<i>Senecio chrysanthemoides</i> DC. ¹	Ph	MC/SA	2420–3150	PU/EES/KH-15212	Afg. to SC China & Indo-China
<i>Serratula pallida</i> DC. ¹	Ph	MC	2430–2440	PU/EES/KH-15213	N. Pak. to Nepal
<i>Sigesbeckia orientalis</i> L. ^{1*}	Tufted Ph	BP	2200–2210	PU/EES/KH-15217	E. Europe to Asia & Australia
<i>Solidago virga-aurea</i> L. ¹	Ph	MC/SA	2670–3810	PU/EES/KH-15220	W. Europe to C. Siberia & Phip.; Himalayas in India
<i>Tanacetum multicaule</i> Sch.Bip. ¹	Ph	SA	3010–3810	PU/EES/KH-15229	Kashmir to SW China
<i>Taraxacum officinale</i> (L.) Weber ex F.H.Wigg. ^{1*}	Semi-prostrate Ph	BP/MC/SA	1920–3410	PU/EES/KH-15230	Cosmopolitan
<i>Tussilago farfara</i> L. ¹	Ph	MC/SA	2670–3130	PU/EES/KH-15236	Palaearctic region; Himalayas in India
<i>Xanthium spinosum</i> L. ^{1*}	Rhizomatous Ph	BP	2230–2240	PU/EES/KH-15128	C. & E. Canada to Mexico, Peru to S. South America
Convolvulaceae					
<i>Convolvulus arvensis</i> L. ^{1*}	Climbing & prostrate Ah or Ph	MC	2440–2460	PU/EES/KH-15078	Eurasia; throughout India
Crassulaceae					
<i>Sedum ewersii</i> Ledeb. ^{1*}	Ph	SA	3790–3810	PU/EES/KH-15210	Siberia to Afg. & N. China; W. Himalayas in India
Cupressaceae					
<i>Juniperus semiglobosa</i> Regel ²	Monoecious ET	MC	2450–2500	PU/EES/KH-1008	SE Iran to C. Asia, Himalayas from Pak. to Uttarakhand
<i>Juniperus squamata</i> Buch.-Ham. ex D.Don ²	Monoecious bushy, semi-prostrate S/ET	SA	3150–3440	PU/EES/KH-1015	N. Afg. to China
Cyperaceae					
<i>Carex stenophylla</i> Wahlenb. ²	Rhizomatous creeping Ph	SA	2800–2920	PU/EES/KH-15058	From Caucasus & Iran to Pak., Kashmir & Mongolia
Dioscoreaceae					
<i>Dioscorea deltoidea</i> Wall. ex Griseb. ¹	Climbing Ph	BP/SA	1880–2810	PU/EES/KH-15091	Himalayas to SC China & Indo-China

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
Elaeagnaceae					
<i>Hippophae rhamnoides</i> L. ¹	Dioecious DT	MC	2400–2500	PU/EES/KH-1204	Palaearctic region; W. Himalayas in India
Equisetaceae					
<i>Equisetum arvense</i> L. ²	Erect or prostrate rhizomatous Ph	BP/SA	2320–3060	PU/EES/KH-15100	Subarctic & temp. N. Hemisphere
Euphorbiaceae					
<i>Euphorbia esula</i> L. ¹	Erect Ph	MC	2600–2760	PU/EES/KH-15104	Palaearctic; W. Himalayas in India
<i>Euphorbia pilosa</i> L. ³	Ph	SA	2920–2930	PU/EES/KH-15105	C. Asia, N. Pak. to Himalayas
<i>Euphorbia wallichii</i> Hook.f. ¹	Ph	SA	3140–3540	PU/EES/KH-15106	Himalayas from Afg. to W. Himalayas to Sikkim
Gentianaceae					
<i>Gentiana carinata</i> (D.Don) Griseb. ¹	Ph	MC/SA	2570–3000	PU/EES/KH-15111	Himalayas from Pak. to Uttarakhand
<i>Gentiana moorcroftiana</i> Wall. ex G.Don ¹	Aromatic, dwarf, creeping mat forming herb	SA	3790–3800	PU/EES/KH-15251	Himalayas from Kashmir to Nepal
<i>Gentiana tianschanica</i> Rupr. ex Kusn. ¹	Ah	SA	3790–3800	PU/EES/KH-15112	Himalayas & China
<i>Lomatogonium caeruleum</i> (Royle) Harry Sm. ex B.L. Burt ¹	Tufted Ph	SA	3790–3810	PU/EES/KH-15140	Himalayas from Kashmir to Nepal
<i>Swertia speciosa</i> D.Don ¹	Ah	SA	2810–2820	PU/EES/KH-15146	Himalayas from Pak. to Bhutan
<i>Swertia petiolata</i> D. Don ¹	Rhizomatous Ph	BP/MC/SA	2310–3210	PU/EES/KH-15228	E. Afg. to W. & C. Himalayas
Geraniaceae					
<i>Geranium pusillum</i> L. ¹	Ph	BP/MC/SA	1920–2920	PU/EES/KH-15113	Europe to W. Himalayas
<i>Geranium wallichianum</i> D.Don ex Sweet ²	Ah	BP/MC/SA	1920–3810	PU/EES/KH-15114	E. Afg. to Himalayas & Tibet
Hamamelidaceae					
<i>Parrotiopsis jacquemontiana</i> (Decne.) Rehder ¹	DS/small DT	BP	2100–2300	PU/EES/KH-1201	E. Afg. to W. Himalayas
Hypericaceae					
<i>Hypericum perforatum</i> L. ^{1*}	Ah or Bh	BP/MC/SA	1980–3540	PU/EES/KH-15121	Europe to China, NW Africa, SW Sudan; W. Himalayas in India
Iridaceae					
<i>Iris hookeriana</i> Foster ¹	Ah	MC/SA	2560–3810	PU/EES/KH-15123	Afg. to W. Himalayas
Juglandaceae					
<i>Juglans regia</i> L. ²	DT	BP	2000–2390	PU/EES/KH-1007	West Asia, W. China & Himalayas
Lamiaceae					
<i>Clinopodium umbrosum</i> (M.Bieb.) Kuntze ^{1*}	Ph	BP/MC/SA	2200–3000	PU/EES/KH-15074	Caucasus to N. Mya.; W. Himalayas in India
<i>Clinopodium vulgare</i> L. ^{1*}	Ph	BP/MC/SA	1920–3280	PU/EES/KH-15075	Medit., Europe to Siberia & W. Himalayas
<i>Lamium album</i> L. ¹	Ph	MC/SA	2560–2930	PU/EES/KH-15127	Palaearctic region; W. Himalayas in India
<i>Nepeta erecta</i> (Royle ex Benth.) Benth. ¹	Ph	MC	2700–2770	PU/EES/KH-15151	E. Afg. to W. Himalayas
<i>Nepeta laevigata</i> (D.Don) Hand.-Mazz. ¹	Ph	BP/MC	2200–2410	PU/EES/KH-15152	Himalayas from Afg. to SW China
<i>Nepeta linearis</i> Royle ex Benth. ¹	Ph	MC/SA	2720–3810	PU/EES/KH-15153	E. Afg. to W. Himalayas
<i>Origanum vulgare</i> L. ^{1*}	Ph	BP/MC/SA	2310–3210	PU/EES/KH-15155	Eurasia; Himalayas in India
<i>Phlomis bracteosa</i> Royle ex Benth. ¹	Rhizomatous Ph	SA	2920–3800	PU/EES/KH-15166	E. Afg. to Himalayas
<i>Phlomis cashmeriana</i> Royle ex Benth. ¹	Ph	BP/MC/SA	2310–2910	PU/EES/KH-15167	Afg. to W. Himalayas
<i>Prunella vulgaris</i> L. ^{2*}	Ph	BP/MC/SA	1920–3150	PU/EES/KH-15191	Europe, N. Africa, N. America & Asia
<i>Salvia hians</i> Royle ex Benth. ¹	Erect Ph	MC	2590–2600	PU/EES/KH-15198	Himalayas from Kashmir to Nepal

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
<i>Salvia moorcroftiana</i> Wall. ex Benth. ¹	Aromatic Ph	MC	2720–2730	PU/EES/KH-15199	Himalayas from Pak. to W. Nepal
<i>Salvia nubicola</i> Wall. ex Sweet ¹	Ph	MC/SA	2700–2920	PU/EES/KH-15200	E. Afg. to Himalayas
<i>Stachys floccosa</i> Benth. ¹	Erect Ph	BP/MC/SA	2390–2710	PU/EES/KH-15223	Himalayas from Afg., Pak. to Kashmir
<i>Stachys sericea</i> Wall. ex Benth. ¹	Ph	SA	2920–2930	PU/EES/KH-15224	Kashmir to SE Tibet
<i>Thymus linearis</i> Benth. ^{1*}	Ah	MC/SA	2500–3000	PU/EES/KH-15250	N. Iran to Xinjiang & Himalayas
Leguminosae					
<i>Argyrobium flaccidum</i> (Royle) Jaub. & Spach ¹	Prostrate Ph	MC	2400–2550	PU/EES/KH-15027	India, Nepal & Pak.
<i>Lathyrus humilis</i> (Ser.) Spreng. ¹	Ah or Ph	SA	3110–3120	PU/EES/KH-15130	E. Europe to temp. Asia & W. Himalayas
<i>Lathyrus laevigatus</i> (Waldst. & Kit.) Gren. ¹	Ph	MC/SA	2670–3060	PU/EES/KH-15131	Europe, Himalayas from Pak. to W. Nepal
<i>Lathyrus pratensis</i> L. ²	Ph	SA	2830–2840	PU/EES/KH-15132	Europe to Mongolia & Himalayas, Morocco, Ethiopia & Yemen
<i>Leonurus cardiaca</i> L. ¹	Scrambling Ph	SA	2920–2930	PU/EES/KH-15133	Europe, Himalayas from Pak. to Nepal
<i>Lespedeza cuneata</i> (Dum.Cours.) G.Don ²	Ah	BP	1980–1990	PU/EES/KH-15136	Afg. to Japan & tropical Asia, E. & SE Australia
<i>Medicago sativa</i> Linn. ¹	Prostrate or decumbent Ph	BP	1920–1930	PU/EES/KH-15143	Europe to Mongolia & Indian Subcontinent
<i>Medicago lupulina</i> L. ^{1*}	Erect or procumbent Ph	BP/MC	1880–2720	PU/EES/KH-15144	Asia, Africa & Europe
<i>Medicago minima</i> (L.) L. ¹	Ah or Ph	MC	2770–2780	PU/EES/KH-15145	Temp. Eurasia to India, tropical Africa to SW. Arabian Peninsula
<i>Oxytropis cachemiriana</i> Cambess. ²	Creeping annual or short-lived Ph	SA	3790–3800	PU/EES/KH-15160	N. Pak. to W. Himalayas
<i>Oxytropis mollis</i> Benth. ¹	Ph	SA	3790–3800	PU/EES/KH-15162	India, Pakistan & Xizang
<i>Robinia pseudoacacia</i> L. ^{2*}	DT	MC	2330–2340	PU/EES/KH-1012	Native to N. America
<i>Trifolium pratense</i> L. ^{2*}	Ph	BP/MC	1980–2710	PU/EES/KH-15234	Europe & N. Asia, Himalayas in India
<i>Trifolium repens</i> L. ^{1*}	Erect to decumbent Ph	BP/MC/SA	1920–3540	PU/EES/KH-15235	Macaronesia, NW Africa, Egypt to Zimbabwe, Europe to Mongolia & Himalayas
<i>Trigonella emodi</i> Benth. ¹	Ph	SA	3800–3810	PU/EES/KH-15232	Afg. to Himalayas
<i>Vicia sativa</i> L. ^{2*}	Bh	MC/SA	2780–3120	PU/EES/KH-15243	Kashmir to Eurasia
Liliaceae					
<i>Fritillaria roylei</i> Hook. ¹	Ph	SA	3800–3900	PU/EES/KH-15252	Pak. to C. China
Malvaceae					
<i>Malva neglecta</i> Wallr. ^{1*}	Ph	BP/MC/SA	2310–2940	PU/EES/KH-15142	Canary Islands, Morocco, Europe to C. Asia & W. Himalayas
Melanthiaceae					
<i>Trillium govianum</i> Wall. ex D.Don ⁵	Erect or spreading Ph	SA	3050–3310	PU/EES/KH-15233	E. Afg. to Himalayas
Oleaceae					
<i>Syringa emodi</i> Wall. ex Royle ¹	DT	MC	2450–2500	PU/EES/KH-1205	Pak. to Nepal & Tibet
Onagraceae					
<i>Circaea alpina</i> L. ¹	Rhizomatous Ph	BP/MC/SA	2380–3000	PU/EES/KH-15069	Temp. N. Hemisphere
<i>Epilobium hirsutum</i> L. ^{2*}	Ph	BP/MC/SA	2200–3150	PU/EES/KH-15097	Temp. Eurasia to Africa; W. Himalayas in India
<i>Epilobium laxum</i> Royle ¹	Ph	SA	2980–2990	PU/EES/KH-15098	C. Asia to W. Himalayas
<i>Oenothera rosea</i> L'Hér. ex Aiton ^{1*}	Ph	BP/MC/SA	2230–2930	PU/EES/KH-15154	Native to C. & S. America
Orchidaceae					
<i>Cypripedium cordigerum</i> D.Don ⁶	Ph	SA	2950–2960	PU/EES/KH-15087	N. Pak. to Himalayas & S. Tibet

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
<i>Epipactis helleborine</i> (L.) Crantz ¹	Rhizomatous Ph	BP/MC/SA	2330–2960	PU/EES/KH-15096	NW Africa, Europe to China; Himalayas in India
<i>Epipactis royleana</i> Lindl. ¹	Rhizomatous Ph	MC/SA	2700–2920	PU/EES/KH-15099	E. Afg. to C. Asia & Himalayas
Orobanchaceae					
<i>Orobanche alba</i> Stephan ¹	Rhizomatous aromatic Ph	MC/SA	2770–3160	PU/EES/KH-15156	Europe, Afg., Pak., W. Himalayas & Tibet
<i>Pedicularis pectinata</i> Wall. ex Benn. ¹	Ph	BP/MC/SA	2310–3810	PU/EES/KH-15163	W. Himalayas from Pak. to W. Nepal
Oxalidaceae					
<i>Oxalis acetosella</i> L. ¹	Tufted Ph	BP/MC/SA	1880–3120	PU/EES/KH-15158	Europe to Japan; W. Himalayas in India
<i>Oxalis corniculata</i> L. ^{1*}	Rhizomatous Ph	BP/MC/SA	1880–2950	PU/EES/KH-15159	Cosmopolitan
Papaveraceae					
<i>Corydalis stewartii</i> Fedde ¹	Rhizomatous Ah or Bh	BP	2200–2210	PU/EES/KH-15080	Afg. to Nepal
Phytolaccaceae					
<i>Phytolacca acinosa</i> Roxb. ¹	Ph	BP/MC	2270–2500	PU/EES/KH-15168	Kashmir to SW China
Pinaceae					
<i>Abies pindrow</i> (Royle ex D.Don) Royle ²	Coniferous ET	BP/MC/SA	2220–3300	PU/EES/KH-1001	N. Afghanistan to Nepal
<i>Cedrus deodara</i> (Roxb. ex D.Don) G.Don ²	Coniferous ET	BP	1810–2200	PU/EES/KH-1005	NE Afg. to W. Nepal & NW India
<i>Picea smithiana</i> (Wall.) Boiss. ²	Coniferous ET	BP/MC/SA	2000–2960	PU/EES/KH-1009	NE Afg. to C. Himalayas
<i>Pinus wallichiana</i> A.B.Jacks. ²	Coniferous ET	BP/MC/SA	1800–3140	PU/EES/KH-1010	Himalayas from Afg. to Tibet
Plantaginaceae					
<i>Plantago lanceolata</i> L. ^{1*}	Ph	BP/MC/SA	1920–2930	PU/EES/KH-15172	Palaearctic & Nearctic regions; Himalayas in India
<i>Plantago major</i> L. ^{2*}	Ph	BP/MC/SA	2200–3160	PU/EES/KH-15173	Europe, N. & C. Asia, introduced all over the world
<i>Veronica laxa</i> Benth. ¹	Ph	BP/MC/SA	2120–3150	PU/EES/KH-15240	N. Pak. to Nepal, C. & S. China & Japan; W. Himalayas in India
<i>Veronica persica</i> Poir. ^{1*}	Ph	SA	2950–2960	PU/EES/KH-15241	Native to Iran, now a worldwide weed; Himalayas in India
Poaceae					
<i>Agrostis gigantea</i> Roth ¹	Rhizomatous Ph	BP/MC/SA	2250–2850	PU/EES/KH-15010	Palaearctic region, introduced in Nearctic; Himalayas in India
<i>Brachypodium sylvaticum</i> (Huds.) P.Beauv. ¹	Tufted Ph	BP/MC	2250–2510	PU/EES/KH-15040	Eurasia; throughout India
<i>Bromus inermis</i> Leyss. ^{1*}	Rhizomatous Ph	BP/MC	2050–2760	PU/EES/KH-15041	Palaearctic & Nearctic regions; W. Himalayas in India
<i>Bromus japonicus</i> Thunb. ^{1*}	Ah	BP/MC/SA	2250–2950	PU/EES/KH-15042	Medit. to temp. Eurasia; W. Himalayas in India
<i>Bromus pectinatus</i> Thunb. ¹	Ah	BP/MC/SA	2250–2300	PU/EES/KH-15043	Europe, Iran & Afg. eastwards through India to China, Pak., Sudan through Ethiopia to Egypt, Sinai & Arabia
<i>Bromus tomentosus</i> Trin. ¹	Rhizomatous Ph	BP/MC	2250–2800	PU/EES/KH-15044	Medit. to Xinjiang & Pak.; W. Himalayas in India
<i>Calamagrostis pseudophragmites</i> (Haller) Koeler ²	Creeping rhizomatous tufted Ph	MC/SA	2450–3800	PU/EES/KH-15049	Europe to Japan & Himalaya; Himalayas in India
<i>Cynodon dactylon</i> (L.) Pers. ¹	Stoloniferous Ph with rhizomes	BP/MC/SA	1920–2930	PU/EES/KH-15083	Temp. & Subtropical Old World to Australia; throughout India
<i>Elymus dahuricus</i> Griseb. ¹	Tufted Ph	MC	2430–2780	PU/EES/KH-15094	Temp. Asia; Himalayas in India
<i>Koeleria macrantha</i> (Ledeb.) Schult. ^{1*}	Rhizomatous Ph	MC/SA	2460–3810	PU/EES/KH-15124	Temp. N. Hemisphere to Mexico; Himalayas in India
<i>Lolium perenne</i> L. ^{1*}	Ph	MC	2420–2430	PU/EES/KH-15139	N. Africa, Europe to Siberia & Himalayas
<i>Oryzopsis gracilis</i> (Mez) Pilg. ¹	Ah or Ph	BP/MC	1920–2630	PU/EES/KH-15157	Iran to China
<i>Phleum alpinum</i> L. ²	Trailing or creeping Ph	BP/MC/SA	2250–3140	PU/EES/KH-15165	Palaearctic & Nearctic regions; Himalayas in India

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
<i>Poa alpina</i> L. ¹	Ph	BP/MC/SA	1980–3150	PU/EES/KH-15174	Temp. N. Hemisphere to Mexico; W. Himalayas in India
<i>Poa pratensis</i> L. ^{2*}	Tufted Ph	BP/MC/SA	2070–2990	PU/EES/KH-15175	Palaearctic & Nearctic region; Himalayas in India
<i>Polypogon fugax</i> Nees ex Steud. ^{1*}	Ph	BP/MC/SA	2310–3000	PU/EES/KH-15180	Iraq to Mya. mainly in Himalayas & C. Asia
<i>Setaria viridis</i> (L.) P.Beauv. ^{1*}	Bh or Ph	BP	2360–2370	PU/EES/KH-15215	Palaearctic; Himalayas in India
<i>Stipa sibirica</i> (L.) Lam. ¹	Caespitose or tufted Ah	BP/MC	1920–2770	PU/EES/KH-15227	Temp. Asia to Himalayas
<i>Vulpia myuros</i> (L.) C.C.Gmel. ^{1*}	Prostrate Ph	BP/MC	2260–2450	PU/EES/KH-15249	Europe to Taiwan & Sri Lanka., Arabian Peninsula & Kenya; throughout India
Polemoniaceae					
<i>Polemonium caeruleum</i> L. ¹	Ah	MC/SA	2590–2960	PU/EES/KH-15178	Europe to C. Siberia & Caucasus, Himalayas from Pak. to W. Nepal
Polygonaceae					
<i>Aconogonon alpinum</i> (All.) Schur ¹	Ph	BP	2300–2400	PU/EES/KH-15003	Palaearctic; W. Himalayas in India
<i>Bistorta amplexicaulis</i> (D.Don) Greene ¹	Erect Ph	BP/MC/SA	2300–3000	PU/EES/KH-15039	E. Afg. to C. China; Himalayas in India
<i>Oxyria digyna</i> (L.) Hill ¹	Ph	SA	2830–3160	PU/EES/KH-15161	Palaearctic & Nearctic regions; Himalayas in India
<i>Persicaria capitata</i> (Buch.-Ham. ex D.Don) H.Gross ¹	Ph	BP/MC/SA	2200–3150	PU/EES/KH-15164	Indian Subcontinent to S. China & Indo-China
<i>Polygonum aviculare</i> L. ^{1*}	Ph	BP/MC/SA	2210–2950	PU/EES/KH-15177	Palaearctic & Nearctic regions; Himalayas in India
<i>Polygonum filiforme</i> Thunb. ¹	Ph	BP	1920–1930	PU/EES/KH-15179	Japan, Korea, India, Mya., Phip. & Vietnam
<i>Rheum webbianum</i> Royle ¹	Ph	SA	3790–3800	PU/EES/KH-15196	Himalayas from Pak. to Nepal
<i>Rumex nepalensis</i> Spreng. ^{1*}	Erect Ph	BP/MC/SA	1920–3410	PU/EES/KH-15197	Afg., India, Pak., Persia, SW China, Turkey, N. Africa & Italy
Primulaceae					
<i>Androsace rotundifolia</i> Sm. ¹	Rhizomatous Ph	MC	2600–2750	PU/EES/KH-15017	Afg., Tibet & W. Himalayas
<i>Androsace sarmentosa</i> Wall. ¹	Ph	MC	2700–2800	PU/EES/KH-15018	Indian Himalayas, Nepal & Tibet
<i>Primula macrophylla</i> D. Don ¹	Erect Ph	MC/SA	2720–3150	PU/EES/KH-15190	Himalayas from Afg. to SE Tibet
Pteridaceae					
<i>Adiantum capillus-veneris</i> L. ²	Epilithic perennial fern	BP/MC/SA	1950–3000	PU/EES/KH-15007	Nearctic, Neotropical, Afrotropical, Australasian, Indomalayan & Palaearctic regions; throughout India
<i>Pteris cretica</i> L. ¹	Rhizomatous Ph	BP	2370–2380	PU/EES/KH-15192	S. Africa, Europe to E. Asia; throughout India
Ranunculaceae					
<i>Aconitum chasmanthum</i> Stapf ex Holmes ³	Ph	SA	3200–3800	PU/EES/KH-15004	Himalayas from Pak. to Nepal & Mongolia
<i>Aconitum heterophyllum</i> Wall. ex Royle ⁵	Rhizomatous Ph	MC/SA	2700–3810	PU/EES/KH-15005	Himalayas from Pak. to C. Nepal
<i>Actaea spicata</i> L. ¹	Rhizomatous Ph	MC/SA	2500–2931	PU/EES/KH-15006	E. Afg. to Himalaya
<i>Anemone obtusiloba</i> Lindl. ¹	Ph	SA	3200–3300	PU/EES/KH-15019	Himalayas, Mongolia, NC China & Kazakhstan
<i>Aquilegia pubiflora</i> Wall. ex Royle ¹	Ph	MC/SA	2500–3200	PU/EES/KH-15020	Afg., Pak., & W. Himalayas
<i>Caltha palustris</i> L. ²	Ph	MC/SA	2800–2950	PU/EES/KH-15048	Palaearctic & Nearctic regions; Himalayas in India
<i>Delphinium roylei</i> Munz ¹	Ph	BP	2200–2210	PU/EES/KH-15088	Pak. & Kashmir
<i>Delphinium vestitum</i> Wall. ex Royle ¹	Ph	MC/SA	2520–3120	PU/EES/KH-15089	Himalayas from Pak. to E. Nepal
<i>Ranunculus hirtellus</i> Royle ¹	Rhizomatous Eh	BP/MC	2250–2780	PU/EES/KH-15193	Himalayas from Kashmir to Sikkim, Tibet & W. China
<i>Ranunculus laetus</i> Wall. ex Hook. f. & J.W. Thomson ^{1*}	Ph	BP/MC/SA	2200–2990	PU/EES/KH-15194	Himalayas from Afg. to SW China

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
<i>Ranunculus palmatifidus</i> Riedl ¹	Erect Ph	BP/MC/SA	2310–2930	PU/EES/KH-15195	W. Himalayas
<i>Thalictrum minus</i> L. ^{1*}	Ph	BP	2310–2340	PU/EES/KH-15231	Himalayas from Pak. to Nepal & temp. Eurasia
Rosaceae					
<i>Agrimonia pilosa</i> Ledeb. ¹	Rhizomatous Ph	BP/MC	2200–2600	PU/EES/KH-15011	N. & EC Europe to Japan & N. Indo-China
<i>Alchemilla trollii</i> Rothm ¹	Ph	MC/SA	2750–3000	PU/EES/KH-15012	W. Himalayas & Pak.
<i>Crataegus songarica</i> K. Koch ^{2*}	DS/small DT	BP	2100–2200	PU/EES/KH-1202	Iran to NW China & W. Himalayas
<i>Filipendula vestita</i> (Wall. ex G. Don) Maxim. ¹	Ph	MC	2420–2780	PU/EES/KH-15107	Afg., Pak., Nepal & W. Himalayas
<i>Fragaria nubicola</i> (Hook. f.) Lindl. ex Lacaita ^{1*}	Stoloniferous Ph	BP/MC/SA	1880–3540	PU/EES/KH-15108	Himalayas from Afg. to Mya.
<i>Geum elatum</i> Wall. ex G. Don ¹	Rhizomatous Ph	MC/SA	2720–3800	PU/EES/KH-15115	Himalayas from Pak. to SE Tibet & SC China
<i>Geum roylei</i> Wall. ex F. Bolle ¹	Ph	BP/MC/SA	2200–3120	PU/EES/KH-15116	Himalayas from Afg. to C. Nepal
<i>Potentilla indica</i> (Andrews) Th. Wolf ^f	Ph	BP/MC	2120–2790	PU/EES/KH-15187	Indomalayan, E. Asia, Indian Himalayas
<i>Potentilla anserina</i> L. ²	Ph	MC/SA	2790–3000	PU/EES/KH-15184	Palaearctic & Nearctic regions; Indian Himalayas
<i>Potentilla eriocarpa</i> Wall. ex Lehm. ¹	Ph	SA	2930–2940	PU/EES/KH-15186	Pak. to SW China
<i>Potentilla nepalensis</i> Hook. ¹	Ph	BP/MC	2260–2790	PU/EES/KH-15188	NE Pak. to W. & C. Himalayas
<i>Prunus cornuta</i> (Wall. ex Royle) Steud. ¹	DT	MC	2700–2800	PU/EES/KH-1017	Himalayas from Afg. to Mya. & SW China
<i>Rosa brunonii</i> Lindl. ^{1*}	Climbing S	MC	2580–2600	PU/EES/KH-1208	NE Afg. to China & Mya., Himalayas in India
<i>Rosa webbiana</i> Wall. ex Royle ¹	DS	BP	2310–2400	PU/EES/KH-1207	C. Asia to W. Himalayas, Tibet & Afg.
<i>Sibbaldia cuneata</i> Schouw ex Kunze ¹	Ah	BP/MC/SA	2200–3810	PU/EES/KH-15216	Afg. to SW China; Himalayas in India
<i>Sorbus lanata</i> (D. Don) S. Schauer ¹	DT	SA	3040–3050	PU/EES/KH-1016	Afg. to W. Himalayas to Nepal
Rubiaceae					
<i>Galium aparine</i> L. ^{1*}	Bulbous Ph	BP/MC/SA	1920–3130	PU/EES/KH-15109	Europe, N. Africa, Asia minor, Siberia, Iran, Afg., Pak. & Himalayas
<i>Galium boreale</i> L. ^{1*}	Climbing Ah	BP/MC/SA	2330–3310	PU/EES/KH-15110	Subarctic & temp. N. Hemisphere; throughout India
Salicaceae					
<i>Populus alba</i> L. ²	Dioecious DT	MC	2430–2440	PU/EES/KH-1014	C. & S. Europe to Xinjiang & W. Himalayas
<i>Populus ciliata</i> Wall. ex Royle ⁴	Dioecious DT	BP	2240–2250	PU/EES/KH-1011	N. Pak. to China & Mya.; Himalayas in India
Sapindaceae					
<i>Acer caesium</i> Wall. ex Brandis ²	Andromonoecious DT	MC/SA	2420–3000	PU/EES/KH-1002	E. Afg. to N. & EC China; W. Himalayas in India
<i>Aesculus indica</i> (Wall. ex Cambess.) Hook. ^{2*}	DT	MC	2750–2800	PU/EES/KH-1003	Afg., Nepal, Pak., E. & W. Himalayas
Saxifragaceae					
<i>Bergenia ligulata</i> Engl. ¹	Ph	MC	2750–2800	PU/EES/KH-15038	E. Afghanistan to China; Himalayas in India
Scrophulariaceae					
<i>Scrophularia decomposita</i> Royle ex Benth. ¹	Ph	SA	2920–3280	PU/EES/KH-15209	C. Asia; W. Himalayas from Afg. to Kumaon
<i>Verbascum thapsus</i> L. ^{1*}	Prostrate Ah	MC/SA	2620–3150	PU/EES/KH-15242	Naturalized throughout the N. Hemisphere; Indian Himalayas
Solanaceae					
<i>Atropa acuminata</i> Royle ex Lindl. ⁵	Ph	MC	2700–2800	PU/EES/KH-15037	Afg., Iran, Pak. & W. Himalayas
<i>Hyoscyamus niger</i> L. ^{1*}	Bh or Ph	SA	3140–3150	PU/EES/KH-15120	Palaearctic region; Himalayas in India

Family/Taxon	Life-form	Forest type	OER	Voucher no.	Phytogeographic distribution
Taxaceae					
<i>Taxus wallichiana</i> Zucc. ⁵	Dioecious conical ET	MC	2560–2760	PU/EES/KH-1013	Himalayas from Afg. to SW China & Mya.
Urticaceae					
<i>Urtica dioica</i> L. ^{2*}	Rhizomatous creeping Ph	BP/MC/SA	2200–3000	PU/EES/KH-15237	Palaearctic, introduced in Neotropic & Nearctic regions; throughout India
Violaceae					
<i>Viola biflora</i> L. ¹	Erect rhizomatous Ph	BP/MC/SA	2200–3120	PU/EES/KH-15245	Palaearctic, Mya.; Indian Himalayas
<i>Viola canescens</i> Wall. ¹	Ph	BP/MC/SA	2250–2960	PU/EES/KH-15246	Bhutan, Nepal, India & Pak.; Temp. Himalayas & W. Ghats
<i>Viola odorata</i> L. ¹	Prostrate rhizomatous Ph	BP/MC/SA	1980–2960	PU/EES/KH-15247	Iran, Iraq, introduced in India & Pak. & Medit. region & Caucasia
<i>Viola pilosa</i> Blume ¹	Rhizomatous prostrate Ah or Ph	BP/MC/SA	1880–2940	PU/EES/KH-15248	Afg., Pak., Indomalayan; throughout India
Xanthorrhoeaceae					
<i>Eremurus himalaicus</i> Baker ¹	Ph	SA	3530–3550	PU/EES/KH-15102	Afg., Pak. W. Himalayas & Tajikistan

OER—Observed elevation range | 1—Not assessed (NA) | 2—Least Concern (LC) | 3—Critically Endangered (CR) | 4—Data Deficient (DD) | 5—Endangered (EN) | 6—Vulnerable (VU) | S—Shrub | Ph—Perennial herb | Ah—Annual herb | DS—Deciduous shrub | ES—Evergreen shrub | SS—Subshrub | DT—Deciduous tree | ET—Evergreen tree | Bh—Biennial herb | *—Alien species | E—Eastern | S—Southern | N—Northern | W—Western | C—Central | W—Western | SW—Southwestern | SE—Southeastern | NW—North-western | NE—Northeastern | SC—Southcentral | EC—Eastcentral | NC—Northcentral | Afg—Afghanistan | Pak—Pakistan | Thail—Thailand | Phip—Philippines | Temp—Temperate | Mya—Myanmar | Medit—Mediterranean | Species in bold are endemic to Himalaya.

effects (Qian et al. 2015). The variation in microclimate would have enabled the taxa to adjust to a wide range of niches along elevation and a variety of pre-adapted lineages to colonize in the mountain ranges. Therefore, it can be considered that climatic factors differentiate taxa as indicated by resilience developed over their evolutionary past, with these phylogenetic variations, in turn, deciding species heterogeneity (Wiens & Donoghue 2004; Rana et al. 2019).

One of the prerequisites for biodiversity conservation is to determine the areas of particular importance in the context of taxa vulnerability and characteristic habitats and critically evaluate the same, thus enabling them to prioritize these areas for further consideration (Spehn 2011). In the present study, the situation for seven (2.57%) taxa categorized under threatened, i.e., *Saussurea costus* & *Aconitum chasmanthum* (CR), *Trillium govianum*, *Aconitum heterophyllum*, *Taxus wallichiana*, & *Atropa acuminata* (EN), and *Cypripedium cordigerum* (VU) were found occasionally in the present study and requires immediate conservational priorities across the landscape. Besides climate change and over-grazing, the species in high demand for traditional medicinal and pharmaceuticals has led to their extensive collection and illegal trading, thus pushing them closer to extinction (Devi et al. 2014; Nowak et al. 2020). The sustainability of such flora is imperative across

the landscape. Ecological rehabilitation, site-specific in particular should be accomplished by re-vegetating degraded sites with natural vegetation. Existing management regulations must be examined in order to adopt strict guidelines to enhance efficiency in decision-making and avoid fraud. Extensive quantitative plant diversity inventories and biogeographical explorations ought to be directed on the threatened flora to identify its abundance and frequency. Additionally, ex situ management methods must be in place in addition to the in situ conservation programmes. Overall, from our study we infer that all three types of coniferous forests are rich in flora, demonstrating their importance for conservation. We hope that our results will serve as a benchmark for potential future studies on plant ecology of the area. With notable plant diversity, Kashmir Himalaya is probably a suitable site for further investigations. Moreover, because Kashmir Himalayan forests face threats due to various anthropogenic activities, qualitative data of documented flora will help local and regional authorities to propose management and conservation priorities.



Image 1. Study area overview: A,B—Low-level blue pine forest | C,D,E—Mixed coniferous forest | F,G,H—Sub-alpine forest. © Ashaq Ahmad Dar



Image 2. Herbs: A—*Aconitum chasmanthum* | B—*Morina longifolia* | C—*Gentiana tianschanica* | D—*Sambucus wightiana* | E—*Vincetoxicum hirundinaria* | F—*Dipsacus inermis*. © Ashaq Ahmad Dar

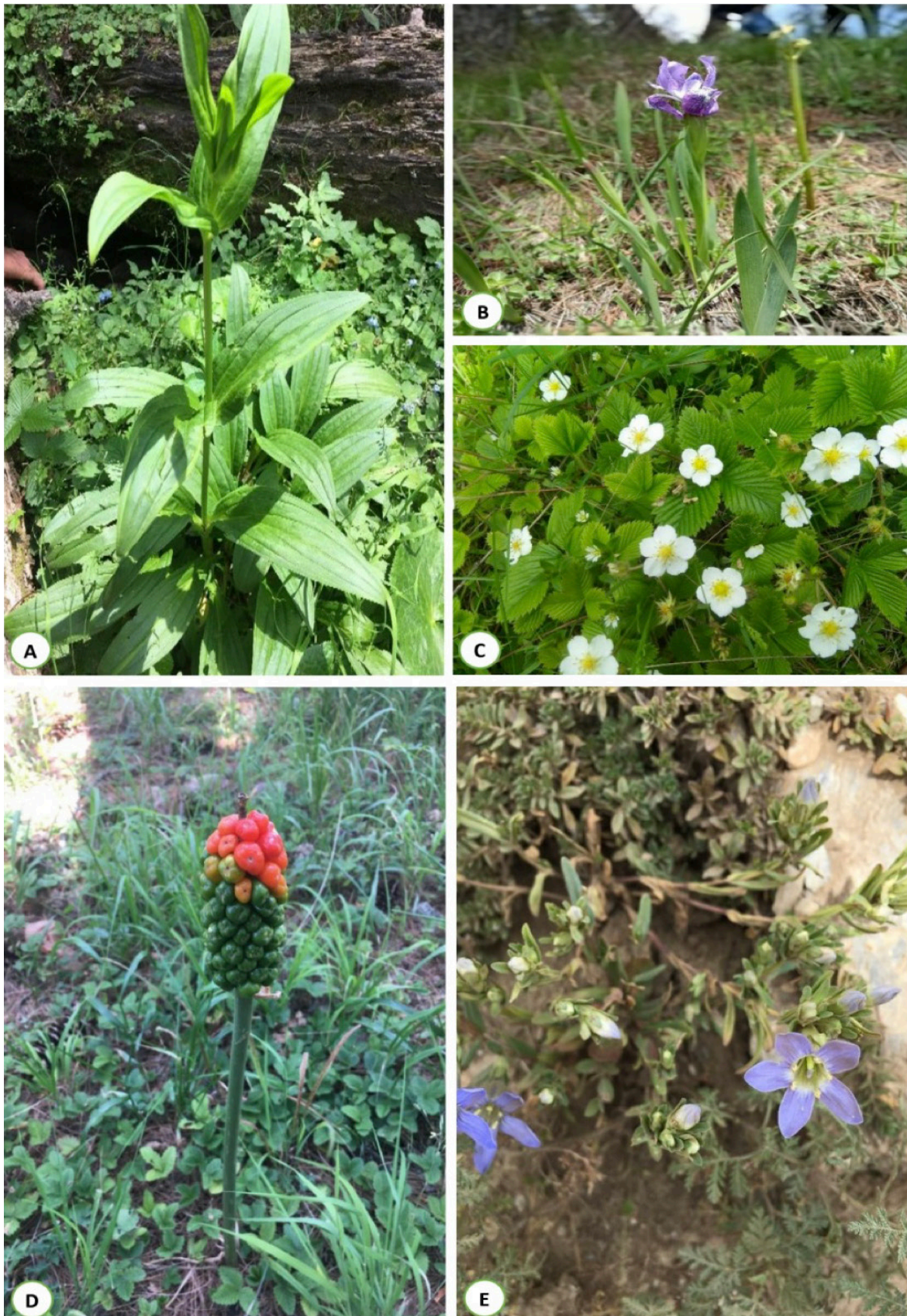


Image 3. Herbs: A—*Swertia speciose* | B—*Iris hookeriana* | C—*Fragaria nubicola* | D—*Arisaema jacquemontii* | E—*Gentiana moorcroftiana*.
© Ashaq Ahmad Dar

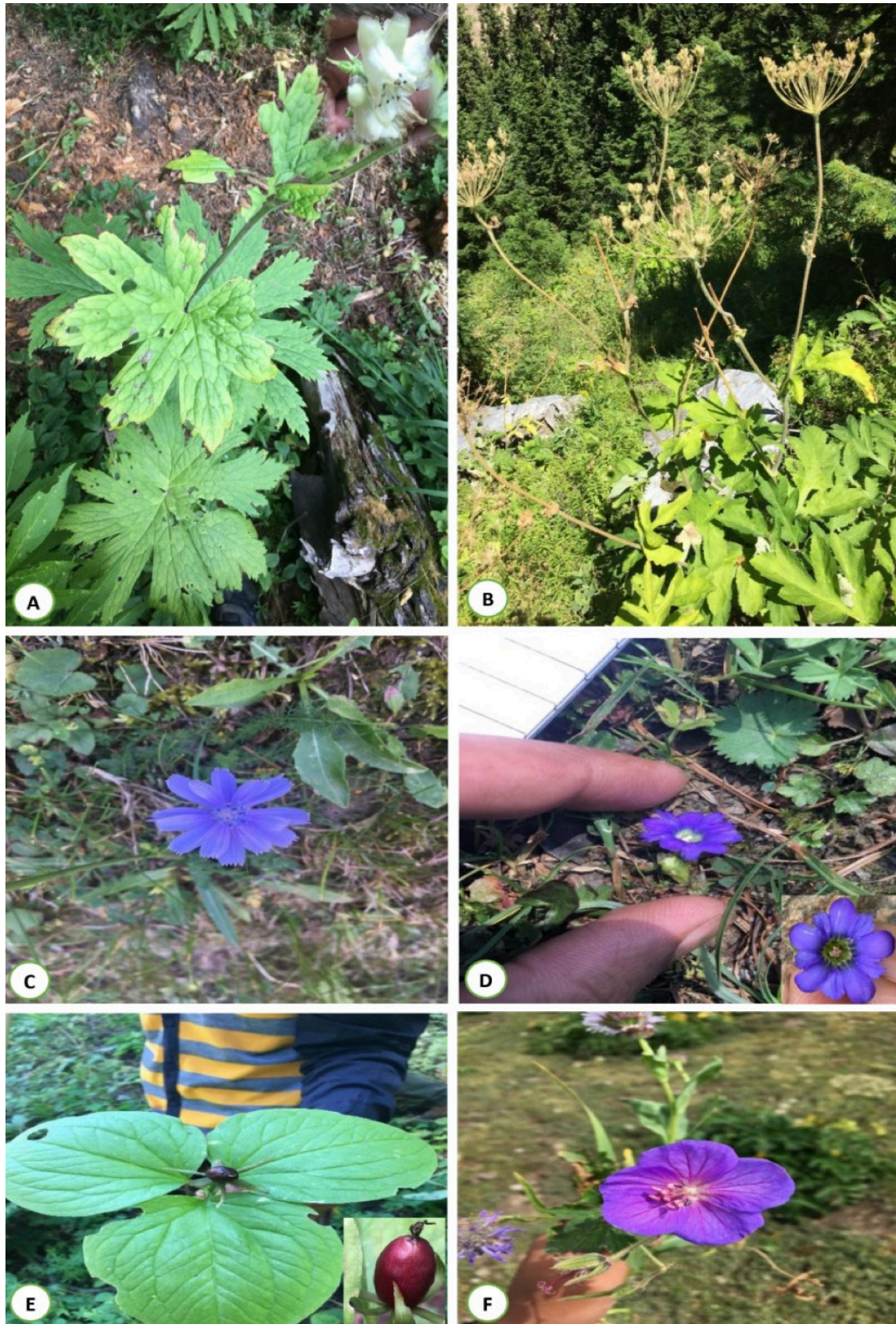


Image 4. Herbs: A—*Filipendula vestita* | B—*Heracleum candicans* | C—*Cichorium intybus* | D—*Gentiana carinata* | E—*Trillium govanianum* | F—*Geranium wallichianum*. © Ashaq Ahmad Dar

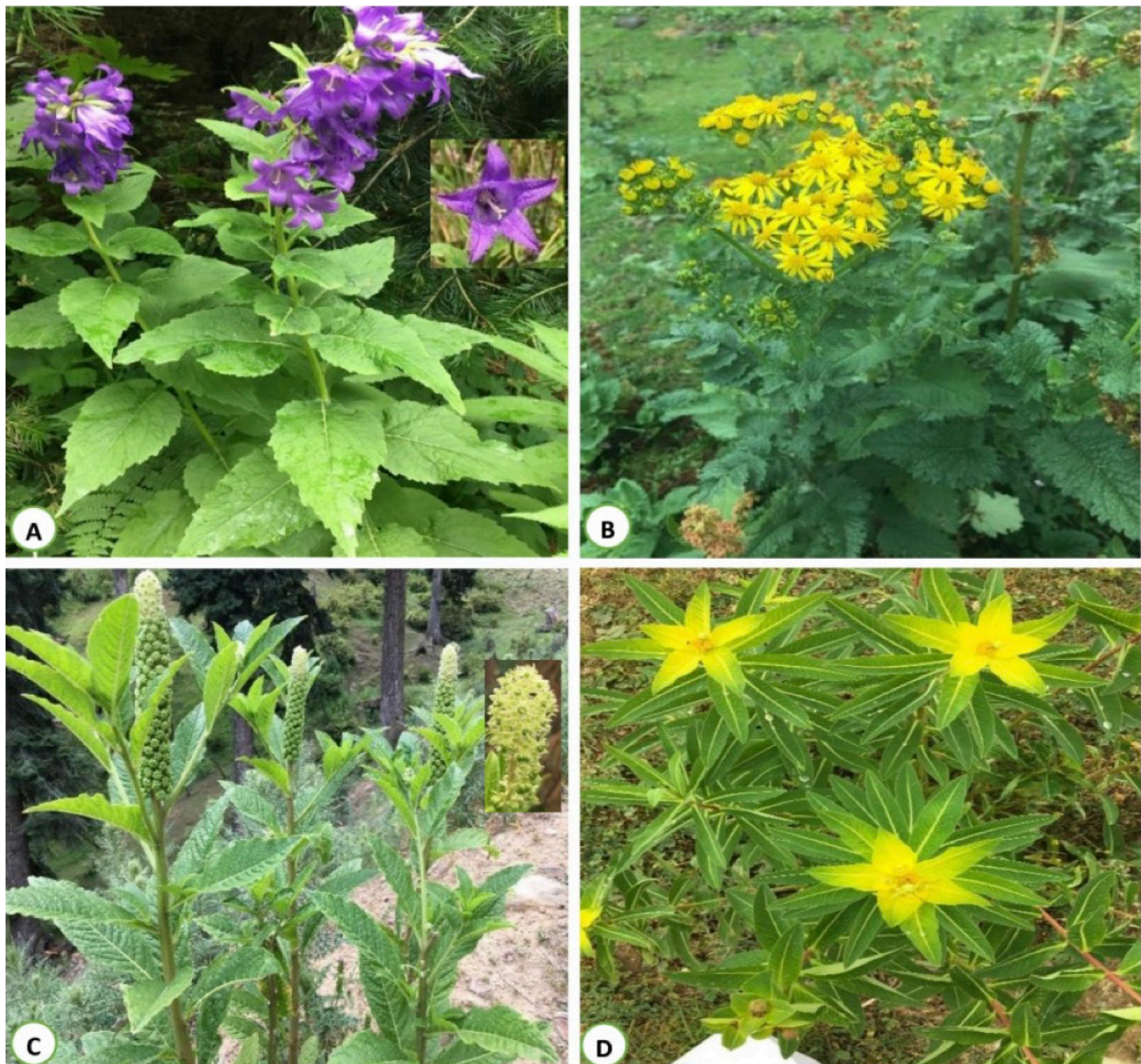


Image 5. Herbs: A—*Campanula latifolia* | B—*Senecio chrysanthemoides* | C—*Phytolacca acinosa* | D—*Euphorbia wallichii*. © Ashaq Ahmad Dar

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Image 6. Trees: A—*Juniperus squamata* | B—*Abies pindrow* | C—*Picea smithiana* | D—*Sorbus lanata*. © Ashaq Ahmad Dar

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Image 7. Shrubs: A—*Syringa emodi* | B—*Parrotiopsis jacquemontiana* | C—*Rosa webbiana* | D—*Hippophae rhamnoides*. © Ashaq Ahmad Dar

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