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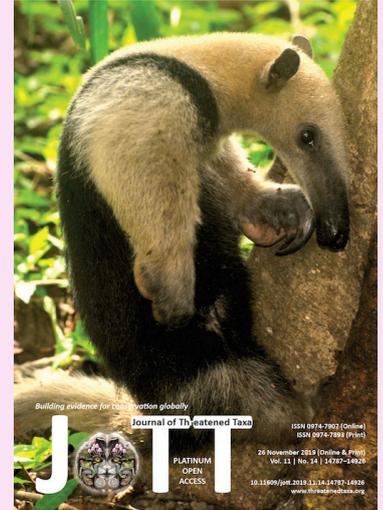
COMMUNICATION

PLANT AND FUNGI DIVERSITY OF DEVI PINDIYAN VALLEY IN TRIKUTA HILLS OF NORTHWESTERN HIMALAYA, INDIA

Sajan Thakur, Harish Chander Dutt, Bikarma Singh, Yash Pal Sharma, Nawang Tashi, Rajender Singh Charak, Geeta Sharma, Om Prakash Vidyarthi, Tasir Iqbal, Bishander Singh & Kewal Kumar

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PLANT AND FUNGI DIVERSITY OF DEVI PINDIYAN VALLEY IN TRIKUTA HILLS OF NORTHWESTERN HIMALAYA, INDIA

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Abstract: The Devi Pindiyan Valley, an abode of Goddess Vaishno Devi, in Trikuta Hills (western Himalaya) is a unique hill-top land ecosystem with a diverse regional mixed subtropical and temperate flora. Because of its suitable geographic location, specific and unique habitat conditions, this mountainous belt of Shivalik Himalaya has a large number of endemic and threatened plant species. This study presents information on the plant diversity of Devi Pindiyan Valley of Trikuta Hills. Several line-transect (100m N-S and 100 E-W) surveys were conducted in which nested quadrats of 10m × 10m were laid for trees, within which interspersed two 5m × 5m sub-quadrats for shrubs and five 1m × 1m sub-quadrats for herbs at different places for determination of floristic composition. In the diverse habitats of this valley, we recorded 213 vascular plant species belonging to 164 genera under 71 families. This study area also harbors rich diversity of fungi, where the most visible 7 species of macrofungi belongs to 7 genera and 4 families were documented. Out of the documented species, 35 species have been categorized as threatened based on the latest IUCN Red list criteria, while 178 species are included in the catalogue of world life. *Engelhardtia spicata* Lechen ex Blume var. *integra* (Kurz) Manning ex Steenis has been categorized as Least Concerned (LC) by IUCN Red List site. The species diversity indicates the high conservation value of this area and documenting such an ecologically rich ecosystem becomes a prerequisite for developing and formulating conservation-cum-management strategies. Therefore, we recommend there is need for ecological research in terms of biodiversity conservation on Devi Pindiyan Valley and similar ecosystems.

Keywords: Conservation status, Devi Pindiyan Valley, floristic composition, Shivalik Himalaya.

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Author contribution: BS, HCD and YPS conceived the idea. ST, HCD, BS, YPS, NT, TQ, RSC, GS, KK and OPV collected, identified, compiled and prepared the manuscript. BS provided the native and non-native status of the species presented in the manuscript.

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INTRODUCTION

Himalayan eco-terrains are globally recognized as a hub and repository of unique biological diversity in Asia, and their distribution differs from tropical to alpine climate (Nayar & Shastry 1987; Singh 2019). The species composition of the Himalayan hills and mountains varies from place to place and these variations depend mainly on different climatic factors coupled with differences in latitude, longitude, and altitude (Singh 2015). The Indian Himalaya are home to more than 8,000 species of vascular plants, of which 4,000 species are endemic and 1,748 are known for their medicinal properties (Samant et al. 1998; Singh 2019a). The western Himalayan geographic region extends from Jammu & Kashmir to the Kumaon belt of Uttarakhand State. The Shivalik region of Jammu division is known for unique and endemic species whose occurrence is due to favorable climatic conditions required for the growth and dissemination of plant species (Singh 2019b). Review of literature reveals that Jammu & Kashmir is home to about 4,439 species of plants (Singh et al. 1999), and out of these, 948 species are published to have medicinal and aromatic value (Gairola et al. 2014). It is evident from the published work that a lot of research has been carried out in this region by different plant scientists to study biodiversity, ethnobotany, ecology, and data up-gradation on environmental parameters (Sharma & Kachroo 1983; Kapur & Sarin 1990; Swami & Gupta 1998; Kirn 2000; Kumar & Hamal 2009; Kumar et al. 2009, 2015; Kumar & Sharma 2011; Bhellum & Magotra 2012; Bhatia et al. 2013, 2014; Dar et al. 2014; Dutt et al. 2015; Kour et al. 2017; Pandita & Dutt 2017; Singh et al. 2016, 2019).

Trikuta Hills in the Himalaya are known for the holy pilgrimage of the shrine of Shri Mata Vaishno Devi and more than 1.5 lakh people visit this place of worship every year from different parts of the globe. This shrine mountain ecosystem has several steep slopes, deep gorges and valleys, rich in different types of vegetation. Ecologically, these hills can be characterized as sub-tropical to temperate mixed vegetation, rich in *Pinus*, *Quercus*, *Engelhardtia*, and *Cedrus* as dominant tree species. The elevation of this mountain ranges from 750 to 2,706m. Many sacred rivers and small streams originate from these hills, and the higher reaches of these hills are occasionally covered with snow during winter months. There are several unexplored regions due to sacred beliefs and tough terrain in the hills. In this study, we present the floral and fungal diversity of Devi Pindiyan Valley with an aim to conserve species in this valley.

MATERIALS AND METHODS

Study Area

Devi Pindiyan Valley of Trikuta Hill is situated 36km from Jammu Town and 13km from Katra City (Reasi District) in Panthal forest area. It lies between latitudes of 32.892 to 33.010N and longitudes of 74.986 to 74.995E and the elevation range of 860–1,360m (Figure 1). It covers approximately an area of 17.3 km². The study area is part of district Reasi of Jammu & Kashmir. This mountainous belt falls in the Palaearctic Realm and the forest terrains are rugged and the hills are characterized by moderate to steep slopes. The vegetation components are characterized by typical subtropical and temperate forests. The forest components as a whole are regarded as a sacred grove and named Devi Pindiyan Shakti Pith. The upper ridges of Trikuta Hill experiences winter snowfall which is responsible for the moderate temperature in summer and cool weather in winter. December–January are the coldest months of the year when minimum temperatures reach minus 4°C. The mean temperature in January is about 8°C, and in May, the temperature rises between 35°C and 40°C. The annual rainfall ranges between 3,200mm and 3,472mm, distributed over 60–90 rain days. A number of seasonal streams that provide water to the local community for domestic purposes originate from the forest reserve. River Jhajjar is one of the important sacred perennial water system originating from Trikuta Hill which runs through the valley. There are only four villages where an indigenous Dogri speaking community of Duggar resides. Due to the remote location, typical physiography and climate, the local people derive much of their livelihood from agriculture, horticulture and floriculture. They mostly depend on forest resources for food, shelter and medicine. Since the region is known as a sacred place, some of them cultivate marigolds for sale in the market which adds to their earnings.

Field Survey, Data Collection and Identification

Four field exploration tours were undertaken for survey, collection and mapping of plant samples from six study sites in Devi Pindiyan Valley from March 2017 till September 2018 with the help of experts from the J&K Forest Department, CSIR-IIIM Jammu, and the University of Jammu (Image 1). Several line-transect (100m N-S and 100m E-W) surveys were conducted at different places for determination of floristic composition. Nested quadrats of 10 × 10m were laid for trees, within which were interspersed two 5 × 5m sub-quadrats for shrubs and five 1 × 1m sub-quadrats for herbs in different

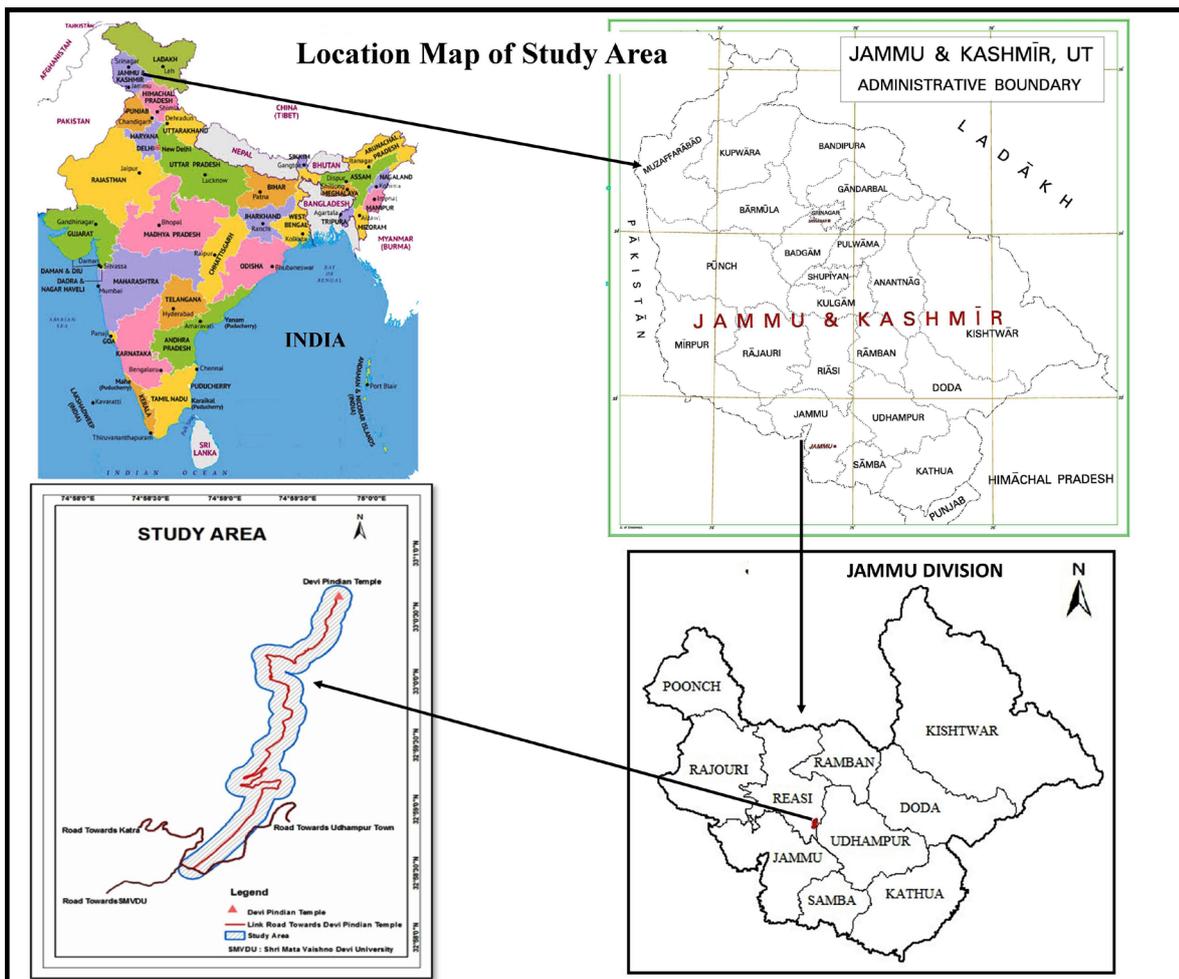


Figure 1. Devi Pindiyan Valley and main sampling plots (details information of each plot is given in Table 1).

Table 1. Characterization of collecting sites from Devi Pindiyan Valley of Trikuta Hill, Shivalik Himalaya.

Survey sites (Date of collection)	Geographical coordinates			Habitat characterized
	Latitude	Longitude	Elevation (m)	
Site 1 (14 March 2017)	32.982° N	74.986° E	860	Tropical forests
Site 2 (19 August 2017)	32.987° N	74.987° E	1020	Mixed tropical and subtropical forests
Site 3 (19 August 2017)	32.994° N	74.990° E	1149	Mixed tropical and subtropical forests
Site 4 (28 April 2018)	32.999° N	74.989° E	1135	Mixed tropical and subtropical forests
Site 5 (28 April 2018)	33.004° N	74.993° E	1089	Mixed tropical and subtropical forests
Site 6 (14 September 2018)	33.010° N	74.995° E	1360	Mixed subtropical and temperate forests

growing seasons. GPS coordinates were recorded by using Garmin Oregon 650 GPS navigation device (Table 1). Data on habit, phenological characters and associated species of plants were collected along with digital photographs. Macro-fungi present in the area were also systematically collected, photographed and preserved. Laboratory studies were conducted in the Department of Botany, University of Jammu and RRLH Janaki Ammal Herbarium at CSIR-Indian Institute of

Integrative Medicine, Jammu (CSIR-IIIM). Conventional herbarium techniques proposed by Jain & Rao (1977) and Rao & Sharma (1990) were followed. The accurate identification and authentication of plants was based on the collected herbarium vouchers and photographs, which were used as unique evidence and reference material for regional distribution. Proper identification and naming of macro-fungi species was done through individual expertise and online databases such as Index



Image 1. Vegetation survey, data collection and identification of plants of Devi Pindiyan Valley. © S. Thakur, B. Singh & O.P. Vidyarthi.

fungorum (www.indexfungorum.org) and Mycobank (www.mycobank.org).

The species were enumerated and photographed through non-invasive methods. The vouchers of the collected plants were identified by comparing them physically with existing preserved specimens at the Herbarium of the University of Jammu (HBJU) and Janaki Ammal Herbarium (RRLH) Jammu. Later, all taxa were authenticated by using taxonomic keys and published floras (Sharma & Kachroo 1983; Kapur & Sarin 1990; Swami & Gupta 1998). The prepared herbarium sheets were deposited at the Herbarium of University of Jammu (HBJU).

Systematization and Presentation

All plant species of Devi Pindiyan were systematically arranged. Families were arranged as per Bentham and Hooker's System of Classification (Bentham & Hooker 1876). Habit of each plant species were categorized as trees, shrubs, herbs and lianas. The correct ICN names of each plant and macro-fungi species were carried out using web-based databases (www.theplantlist.org, www.indexfungorum.org and www.mycobank.org). The threat status of each species was determined using the online database of IUCN Red List (www.iucnredlist.org) and presented as Critically Endangered, Endangered, Vulnerable, Least Concern, Data Deficient and if

similar information was not available, then they were designated as NA.

RESULTS

Forest Characterization

The intermediate climate between the subtropical and the temperate vegetation along with the topography of the Devi Pindiyan Valley is responsible for its unusual mixed type of vegetation. The forest belts possess different types of very unique plant associations such as mixed deciduous broad-leaved forests, lower pine association coupled with secondary scrub parameters. This valley is dominated by species such as *Sapium sebiferum*, *Grewia optiva* and *Toona ciliata* in mixed broad-leaved areas. *Pinus roxburghii*, *Phoenix dactylifera*, *Trema politoria*, and *Debregeasia longifolia* at the upper hills mixed with pine vegetation. The secondary scrubby layers are dominated by *Woodfordia fruticosa*, *Justicia adhatoda*, *Euphorbia royleana* and *Ehretia acuminata*.

Floristic Composition and Analysis

A total of 213 plant species belonging to 165 genera and 71 vascular plant families were collected from the Devi Pindiyan and associated hills of Trikuta Mountain (Appendix 1). Out of a total of 213 plant species, 204 were angiosperms (166 dicots and 38 monocots), one was gymnosperm and the remaining eight were pteridophytes (Table 2). The highly represented families were Poaceae (19 species), Lamiaceae (14 species), Fabaceae (13 species), Asteraceae & Moraceae (12 species each), Solanaceae (9 species), Euphorbiaceae (8 species), Rosaceae (7 species), Ranunculaceae (6 species) & Malvaceae, Pinaceae and Pteridaceae (5 species each). Highly represented genera in the valley were *Ficus* (10 species), *Euphorbia* & *Solanum* (5 species each), *Rubus* (4 species), and *Acacia* & *Datura* (3 species each). A total of 95 plant species were herbaceous in habit, 48 were shrubby bushes, 54 were trees and 16 were climbers. Some snapshots of species diversity are given in Images 2 and 3.

Besides vascular plant diversity, this region also exhibits macrofungal diversity, of which some are used as food or medicine by the local inhabitants of the study area. While investigating, seven macro-fungi were documented from the study area that include *Ganoderma lucidum* (Curtis) P.Karst. (Ganodermataceae), *Schizophyllum commune* Fr. (Schizophyllaceae), *Termitomyces heimii* Natarajan (Lyophyllaceae), *Macrolepiota procera* Scop., *Agaricus*

Table 2. Classification of vascular plants distribution in Devi Pindiyan Valley.

Taxon	Family	Genus	Species	Total
I. Lycophytes and Ferns	5	6	8	8
II. Gymnosperms	1	1	1	1
III. Angiosperms	65	158	204	204
Monocotyledons	12	33	38	38
Dicotyledons	53	125	166	166
Total	71	165	213	213

arvensis Schaeff., *Calvatia gigantea* (Batsch) Lloyd, and *Bovista minor* Morgan (all Agaricaceae members). The first two macro-fungi (*Ganoderma lucidum* and *Schizophyllum commune*) are used as medicine by the local people, whereas the remaining were recorded as being used as wild edible macro-fungi (Image 4).

Economically Valued Plants

Out of a total of 213 plant species collected from the area, 76.05% (162 spp.) are reported in literature as high valued medicinal plants (Samant et al. 1998; Bhatia et al. 2013, 2014; Gairola et al. 2014; Dutt et al. 2015). Some abundantly growing medicinal plants of Devi Pindiyan Valley and its associated mountain ranges include *Achyranthes bidentata*, *Acacia modesta*, *Artemisia nilagirica*, *Berberis lycium*, *Bergenia pacumbis*, *Cissampelos pareira*, *Colebrookea oppositifolia*, *Colchicum luteum*, *Cryptolepis dubia*, *Datura innoxia*, *Holarrhena pubescens*, *Micromeria biflora*, *Mentha longifolia*, *Ocimum americanum*, *Plantago lanceolata*, *Sida rhombifolia*, *Valeriana jatamansi*, *Verbascum thapsus*, *Viola canescens*, and *Zanthoxylum armatum*.

While gathering oral information from local people, 26 species were recorded as edible and consumed as wild leafy vegetables, wild fruits or seeds. Most abundantly growing plants under this category are *Colocasia esculenta*, *Debregeasia longifolia*, *Ficus spicata*, *Mentha spicata*, *Morus alba*, *Murraya koenigii*, *Rubus ellipticus*, *Rubus niveus*, *Rumex hastatus*, *Zanthoxylum armatum* and *Ziziphus jujuba*. The study area is composed of nearly 55 timber yielding plants, with *Engelhardtia spicata*, *Ficus semicordata*, *Ficus racemosa*, *Mallotus philippensis*, *Kigelia africana*, *Melia azedarach*, and *Pinus roxburghii* being the most dominant tree species. We also recorded 10 plants from the area as a source of dye such as *Impatiens balsamina*, *Impatiens bicolor*, *Geranium nepalensis*, *Acacia catechu*, and *Pistacia chinensis* (Figure 2).



Image 2. Plant diversity found in Devi Pindiyan Valley and adjoining areas: A—*Engelhardtia spicata* Lechen ex Blume var. *integra* (Kurz) Manning ex Steenis | B—*Woodwardia radicans* (L.) Sm. | C—*Euphorbia royleana* Boiss. | D—*Thysanolaena latifolia* (Roxb. ex Hornem.) Honda | E—*Adiantum recurvatum* (D. Don) Fraser-Jenk. | F—*Pteris vittata* L. | G—*Toona sinensis* (A. Juss.) M. Roem. | H—*Vitex altissima* L. f. | I—*Rubus ellipticus* Sm. | J—*Senna occidentalis* (L.) Link | K—*Bauhinia variegata* L. | L—*Dendrocalamus strictus* (Roxb.) Nees. © S. Thakur, B. Singh & O.P. Vidyarthi.

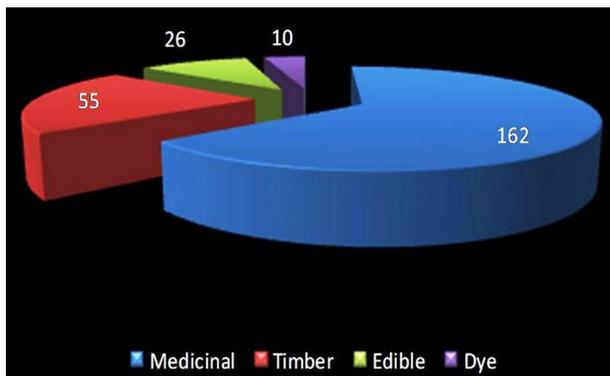


Figure 2. Economically valued plants of Devi Pindiyan Valley.

Native and Non-Native Status

Of the total 213 investigated species, 124 species representing 58.22% are native to the Palaeartic Realm and remaining 89 species (41.78%) are non-native to India and adjoining areas (Appendix 1). They are either introduced, alien (invasive) or recorded from other regions as native plants. They are European, African, Australian, or tropical American origin plants escaped to have distribution in the study area (India) as invasive or were introduced sometime in history. A total of 32 species (15.02%) are native to India or are exclusively endemic to the Himalayan regions. Common endemic species to Himalaya include *Mimosa himalayana*, *Valeriana jatamansi*, *Neolitsea umbrosa*, *Engelhardtia spicata*, *Colchicum luteum*, *Isachne himalaica*, *Colebrookea oppositifolia*, *Ficus semicordata*, *Delphinium denudatum*, *Grewia optiva*, *Acacia modesta*, *Begonia picta*, *Heracleum candicans*, *Selinum vaginatum*, and *Euphorbia royleana*. About 0.93% species have nativity in Indo-Malayan regions. There are several species which are of Chinese origin and have abundant growth in the study area includes *Ficus sarmentosa*, *Hedychium spicatum*, *Pteris vittata*, and *Pistacia chinensis*.

Threats and Conservation Perspectives

Human disturbance coupled with habitat fragmentation have been identified as a major cause of biodiversity loss in many hotspots. Destruction of forests has resulted in the degradation of the environment and habitat of native species of the state. The rich genetic diversity has been depleted and many plant species are facing the threat of extinction in their natural habitats. Expansion of developmental activities (road/dam/city construction), logging, mining and similar associated activities are major threats to plant and animal species. The conservation status of all collected

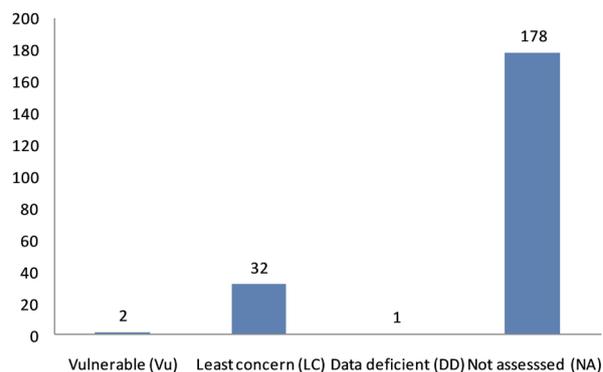


Figure 3. Graphical representation of species of Devi Pindiyan Valley as per IUCN.

and authenticated species were worked out following IUCN Red List website (www.iucnredlist.org), and out of a total of 213 species, 34 species have been categorized under one or other threat concern. Total 32 species were listed as Least Concern (LC) species, 1 species each were categorized under Vulnerable (V) category and Data Deficient (DD) and remaining 178 species were not assessed as per IUCN classification (Figure 3)

DISCUSSION

The endemic species with limited geographical ranges are susceptible to extinction as they are extremely vulnerable to environmental changes, while widely distributed species can cope with the changing environment and anthropogenic disturbances (Rao et al. 2003). In this study, we reviewed for the first time, and presented the plant diversity of unexplored Devi Pindiyan Valley of Trikuta Hills in Shivalik Himalaya. In the diverse habitats of this valley, we recorded 213 vascular plants of 164 genera under 71 families, and seven macro-fungal genera belonging to four families, indicating that the flora of the surveyed region shows high diversity. In fact, while surveying and exploring the interior belts, we often found a large number of plant species from a certain small area, which were very different in habitat condition from their surroundings. In addition to these, we were able to mark wide variations in ecological conditions found within the explored area along with variations in altitudes. According to the Botanical Survey of India, Jammu & Kashmir in the western Himalaya is one such region which has been floristically under-explored (Dar et al. 2012), and the present finding helps to fill the data gap. Few research projects were previously conducted in the area, and one of them was of Kapur (1982),



Image 3. Plant diversity found in Devi Pindiyan Valley and adjoining areas: A—*Toona ciliata* M.Roem. | B—*Mimosa himalayana* Gamble | C—*Neolamarckia cadamba* (Roxb.) Bosser | D—*Cotinus coggygria* Scop. | E—*Rhamnus triquetra* (Wall.) Brandis | F—*Sauromatum venosum* (Aiton) Kunth | G—*Cissampelos pareira* L. | H—*Leucas lanata* Benth. | I—*Boehmeria macrophylla* Hornem. | J—*Impatiens balsamina* L. | K—*Impatiens bicolor* Royle | L—*Viola canescens* Wall. | M—*Pinus roxburghii* Sarg. | N—*Olea paniculata* R.Br. | O—*Thalictrum foliolosum* | P—*Saccharum spontaneum* L. | Q—*Zanthoxylum armatum* DC. © S. Thakur, B. Singh & O.P. Vidyarthi.



Image 4. Macro-fungal diversity found in Devi Pindiyan Valley and adjoining areas: A—*Ganoderma lucidum* (Curtis) P.Karst. | B—*Schizophyllum commune* Fr. | C—*Termitomyces heimii* Natrajan | D—*Macrolepiota procera* Scop. | E—*Agaricus arvensis* Schaeff. | F—*Calvatia gigantea* (Batsch) Lloyd | G—*Bovista minor* Morgan. © Y.P. Sharma.

who studied the phytoecology and forest associations, but very little data on ecology was presented. Lesser known species outside their natural habitat are facing threats of existence seeing in vulnerable category and may slowly move towards the verge of extinction due to unabated anthropogenic activities such as deforestation and illicit extraction of valuable medicinal plants. Hence, such species need immediate conservation measures and research on ecological restoration. Owing to our extensive study efforts in the Devi Pindiyan, this documented research will provide a good notion of the plant diversity and reasons for conservation of this sacred place for the future.

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Appendix 1. List of plants in Devi Pindiyan Valley of Trikuta Hills, Shivalik Himalaya.

	Botanical name	Phenology period	Habit	IUCN status	Nativity status	Voucher no.
	DICOTS					
	Ranunculaceae					
1.	<i>Clematis barbellata</i> Edgew.	June–August	Climber	NA	Native to Palearctic realm and in Himalaya	HBJU125
2.	<i>Clematis gouriana</i> Roxb. ex DC.	September–December	Climber	NA	Native to Palearctic realm	HBJU126
3.	<i>Delphinium denudatum</i> Wall. ex Hook.f. & Thomson	May–September	Herb	NA	Native to Himalaya	HBJU151
4.	<i>Ranunculus distans</i> Royle	June–August	Herb	NA	Native to Himalaya	HBJU206
5.	<i>Ranunculus muricatus</i> L.	March–July	Herb	NA	Non-native to India, and native of Europe	HBJU276
6.	<i>Thalictrum foliolosum</i> DC.	August–December	Herb	NA	Native to Himalaya	HBJU226
	Menispermaceae					
7.	<i>Cissampelos pareira</i> L.	March–October	Climber	NA	Native to India	HBJU124
8.	<i>Cocculus laurifolius</i> DC.	March–August	Climber	NA	Native to Himalaya	HBJU127
	Berberidaceae					
9.	<i>Berberis lycium</i> Royle	April–June	Shrub	NA	Native to Palearctic realm	HBJU112
	Papaveraceae					
10.	<i>Fumaria indica</i> Pugsley	March–July	Herb	NA	Native to Palearctic realm	HBJU178
	Violaceae					
11.	<i>Viola odorata</i> L.	April–September	Herb	NA	Non-native, introduced from Europe	HBJU290
12.	<i>Viola canescens</i> Wall.	March–July	Herb	NA	Native to Himalaya	HBJU288
	Malvaceae					
13.	<i>Bombax ceiba</i> L.	November–March	Tree	NA	Non-native to India and introduced	HBJU115
14.	<i>Grewia asiatica</i> L.	March–September	Tree	NA	Non-native to India	HBJU159
15.	<i>Grewia optiva</i> (Buch.-Ham. ex Roxb.) J.R.Drumm. ex Burret	April–September	Tree	NA	Native to Himalaya	HBJU184
16.	<i>Pterospermum acerifolium</i> (L.) Willd.	December–July	Tree	NA	Native to Palearctic realm (Southeastern Asia)	HBJU203
17.	<i>Sida rhombifolia</i> L.	September–January	Shrub	NA	Non-native to India, and native to New World (America & Oceania)	HBJU263
	Linaceae					
18.	<i>Reinwardtia indica</i> Dumort.	April–January	Shrub	NA	Native to Himalaya	HBJU246
	Geraniaceae					
19.	<i>Geranium nepalense</i> Sweet	April–October	Herb	NA	Native to Himalaya	HBJU156
20.	<i>Geranium mascatense</i> Boiss.	February–May	Herb	NA	Native to Palearctic realm (Himalaya)	HBJU277
	Balsaminaceae					
21.	<i>Impatiens balsamina</i> L.	July–October	Herb	NA	Non-native to India, and native to tropical America	HBJU190
22.	<i>Impatiens bicolor</i> Royle	May–October	Herb	NA	Non-native to India	HBJU191
	Oxalidaceae					
23.	<i>Oxalis corniculata</i> L.	February–October	Herb	NA	Non-native to India, and native of Europe	HBJU228
	Rutaceae					
24.	<i>Aegle marmelos</i> (L.) Corrêa	October–January	Tree	NA	Non-native to India and introduced	HBJU107
25.	<i>Murraya koenigii</i> (L.) Spreng.	March–August	Tree	NA	Native to Palearctic realm	HBJU187
26.	<i>Zanthoxylum armatum</i> DC.	April–October	Shrub	NA	Native to Palearctic realm (Southeastern Asia)	HBJU239

	Botanical name	Phenology period	Habit	IUCN status	Nativity status	Voucher no.
	Meliaceae					
27.	<i>Melia azedarach</i> L.	March–October	Tree	LC	Non-native to India, and native of Bangladesh	HBJU180
28.	<i>Toona ciliata</i> M.Roem.	January–August	Tree	LC	Non-native to India	HBJU229
29.	<i>Toona sinensis</i> (AJuss.) M.Roem.	May–January	Tree	NA	Native to Palaeartic realm (Southeastern Asia)	HBJU281
	Rhamnaceae					
30.	<i>Rhamnus triquetra</i> (Wall.) Brandis	July–September	Tree	NA	Native to Palaeartic realm	HBJU247
31.	<i>Ziziphus jujuba</i> Mill.	May–October	Tree	LC	Native to Palaeartic realm (Southeastern Asia)	HBJU294
32.	<i>Ziziphus oenopolia</i> (L.) Mill.	August–December	Shrub	NA	Native to Palaeartic realm	HBJU295
	Sapindaceae					
33.	<i>Cardiospermum halicacabum</i> L.	June–October	Climber	NA	Non-native to India and invasive	HBJU149
34.	<i>Dodonaea viscosa</i> (L.) Jacq.	January–August	Shrub	NA	Non-native to India	HBJU160
	Anacardiaceae					
35.	<i>Cotinus coggrygia</i> Scop.	February–November	Shrub	LC	Non-native to India, and native of Southern Europe	HBJU140
36.	<i>Lannea coromandelica</i> (Houtt.) Merr.	March–September	Tree	NA	Native to Palaeartic realm (Southeastern Asia)	HBJU202
37.	<i>Mangifera indica</i> L.	March–September	Tree	DD	Native of Indo-Malaya region, planted	HBJU212
38.	<i>Pistacia chinensis</i> Bunge	March–November	Tree	NA	Native to Palaeartic realm (Western China)	HBJU233
	Fabaceae					
39.	<i>Acacia catechu</i> (L.f.) Willd.	April–September	Tree	NA	Native to Palaeartic realm	HBJU101
40.	<i>Acacia modesta</i> Wall.	May–October	Tree	NA	Native to Himalaya	HBJU102
41.	<i>Acacia nilotica</i> (L.) Delile	March–August	Tree	LC	Non-native to India and native of Tropical America	HBJU103
42.	<i>Bauhinia vahlii</i> Wight & Arn.	April–August	Climber	NA	Native to Palaeartic realm (Southeastern Asia)	HBJU110
43.	<i>Bauhinia variegata</i> L.	February–July	Tree	LC	Native to Palaeartic realm (Southeastern Asia)	HBJU111
44.	<i>Cassia fistula</i> L.	April–July	Tree	NA	Native to Palaeartic realm	HBJU119
45.	<i>Indigofera cassioides</i> DC.	January–June	Shrub	NA	Native to Palaeartic realm	HBJU163
46.	<i>Indigofera heterantha</i> Wall. ex Brandis	May–October	Shrub	NA	Native to Palaeartic realm	HBJU193
47.	<i>Lespedeza gerardiana</i> Wall. Ex Maxim.	September–December	Shrub	NA	Native to Palaeartic realm	HBJU175
48.	<i>Mimosa himalayana</i> Gamble	June–December	Shrub	NA	Endemic to Himalaya	HBJU183
49.	<i>Pueraria tuberosa</i> (Willd.) DC.	March–August	Climber	NA	Native to Palaeartic realm (India)	HBJU204
50.	<i>Senna occidentalis</i> (L.) Link	October–March	Shrub	NA	Non-native to India, and native to tropical South America	HBJU217
51.	<i>Senna tora</i> (L.) Roxb.	November–February	Shrub	NA	Non-native to India, and native to tropical South America	HBJU218
	Rosaceae					
52.	<i>Cotoneaster nummularius</i> Fisch. & C.A.Mey.	May–October	Shrub	NA	Native to Palaeartic realm (Southeastern Asia, Himalaya)	HBJU132
53.	<i>Prunus cerasoides</i> Buch.-Ham. ex D.Don	October–March	Tree	LC	Native to Palaeartic realm (Southeastern Asia)	HBJU199
54.	<i>Rubus ellipticus</i> Sm.	March–May	Shrub	NA	Native to Palaeartic realm (Southeastern Asia, India)	HBJU210
55.	<i>Rubus niveus</i> Thunb.	May–September	Shrub	NA	Native to Palaeartic realm	HBJU250
56.	<i>Rubus paniculatus</i> Sm.	June–October	Shrub	NA	Native to Palaeartic realm	HBJU251
57.	<i>Rubus rosifolius</i> Sm.	March–July	Shrub	NA	Native to Himalaya	HBJU211
58.	<i>Spiraea bella</i> Sims	May–September	Shrub	NA	Native to Himalaya	HBJU224

	Botanical name	Phenology period	Habit	IUCN status	Nativity status	Voucher no.
	Saxifragaceae					
59.	<i>Bergenia pacumbis</i> (Buch.-Ham. ex D.Don) C.Y.Wu & J.T.Pan	June–August	Herb	NA	Native to Palaeartic realm (Himalaya)	HBJU146
	Myrtaceae					
60.	<i>Psidium guajava</i> L.	May–September	Tree	NA	Non-native, introduced from Europe	HBJU200
	Lythraceae					
61.	<i>Woodfordia fruticosa</i> (L.) Kurz	January–May	Shrub	LC	Native to Asia (Himalaya)	HBJU292
	Onagraceae					
62.	<i>Oenothera rosea</i> L'Hér. ex Aiton	May–December	Herb	NA	Native to Palaeartic realm	HBJU225
	Begoniaceae					
63.	<i>Begonia picta</i> Sm.	July–September	Herb	NA	Native to Himalaya	HBJU278
	Apiaceae					
64.	<i>Heracleum candicans</i> Wall. ex DC.	May–September	Herb	NA	Native to Himalaya	HBJU244
65.	<i>Ligusticum elatum</i> (Edgew.) C.B. Clarke	July–September	Herb	NA	Native to Himalaya	HBJU209
66.	<i>Selinum vaginatum</i> C.B. Clarke	June–October	Herb	NA	Native to Himalaya	HBJU260
	Araliaceae					
67.	<i>Hedera helix</i> L.	September–May	Climber	NA	Non-native to India, and native of Europe	HBJU185
	Caprifoliaceae					
68.	<i>Valeriana jatamansi</i> Jones	April–September	Herb	NA	Endemic to Himalaya	HBJU232
	Adoxaceae					
69.	<i>Viburnum nervosum</i> D.Don	April–October	Shrub	NA	Native to Palaeartic realm (Southeastern Asia)	HBJU286
	Rubiaceae					
70.	<i>Catunaregam spinosa</i> (Thunb.) Tirveng.	March–June	Tree	NA	Native to Palaeartic realm	HBJU120
71.	<i>Neolamarckia cadamba</i> (Roxb.) Bosser	June–November	Tree	NA	Non-native to India	HBJU312
72.	<i>Spermadictyon suaveolens</i> Roxb.	September–March	Shrub	NA	Non-native to India, Native of Tropical America	HBJU223
73.	<i>Wendlandia heynei</i> (Schult.) Santapau & Merchant	March–August	Tree	NA	Native to Palaeartic realm	HBJU236
	Asteraceae					
74.	<i>Ageratum conyzoides</i> (L.) L.	January–December	Herb	NA	Non-native, invasive to India and native from tropical America	HBJU105
75.	<i>Artemisia nilagirica</i> (C.B. Clarke) Pamp.	July–October	Herb	NA	Native to Palaeartic realm	HBJU131
76.	<i>Bidens biternata</i> (Lour.) Merr. & Sherff	January–December	Herb	NA	Non-native, invasive to India and native to tropical America	HBJU113
77.	<i>Cirsium arvense</i> (L.) Scop.	June–October	Herb	NA	Non-native, invasive to India	HBJU123
78.	<i>Erigeron bonariensis</i> L.	May–October	Herb	NA	Non-native, invasive to India	HBJU144
79.	<i>Inula cuspidata</i> (Wall. ex DC.) C.B. Clarke	June–August	Shrub	NA	Native to Himalaya	HBJU164
80.	<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal	June–October	Herb	NA	Native to Palaeartic realm (Southeastern Asia)	HBJU172
81.	<i>Parthenium hysterophorus</i> L.	April–August	Herb	NA	Non-native and invasive to India, and native of Tropical America	HBJU253
82.	<i>Silybum marianum</i> (L.) Gaertn.	February–September	Herb	NA	Non-native, Mediterranean and Africa	HBJU264
83.	<i>Sonchus arvensis</i> L.	July–September	Herb	NA	Non-native to India, and native of Europe	HBJU272
84.	<i>Sonchus oleraceus</i> (L.) L.	May–December	Herb	NA	Non-native to Palaeartic realm	HBJU273
85.	<i>Taraxacum campylodes</i> G.E. Haglund	September–March	Herb	NA	Non-native, introduced from Mediterranean and Africa	HBJU268
	Oleaceae					
86.	<i>Jasminum grandiflorum</i> L.	August–January	Shrub	NA	Native to Palaeartic realm (Southeastern Asia)	HBJU168

	Botanical name	Phenology period	Habit	IUCN status	Nativity status	Voucher no.
87.	<i>Ligustrum nepalense</i> Wall.	April–July	Tree	NA	Native to Palaeartic realm	HBJU177
88.	<i>Olea paniculata</i> R.Br.	April–November	Tree	NA	Native to Palaeartic realm (Himalaya)	HBJU313
	Apocyanaceae					
89.	<i>Carissa spinarum</i> L.	April–June	Shrub	NA	Non-native to India, probably native of South Africa	HBJU118
90.	<i>Cryptolepis dubia</i> (Burm.f.) M.R.Almeida	March–November	Climber	NA	Native to Palaeartic realm	HBJU133
91.	<i>Holarrhena pubescens</i> Wall. ex G.Don	April–December	Tree	LC	Non-native to India, and native of Africa	HBJU188
	Boraginaceae					
92.	<i>Cynoglossum wallichii</i> G.Don	May–August	Herb	NA	Native to Palaeartic realm	HBJU135
93.	<i>Cynoglossum zeylanicum</i> (Vahl ex Hornem.) Thunb. ex Lehm.	April–October	Herb	NA	Native to Palaeartic realm	HBJU136
94.	<i>Ehretia acuminata</i> R.Br.	March–May	Tree	NA	Native to Palaeartic realm	HBJU157
	Convolvulaceae					
95.	<i>Ipomoea purpurea</i> (L.) Roth	June–September	Climber	NA	Non-native and invasive to India	HBJU165
96.	<i>Ipomoea calophylla</i> Fenzl	August–November	Climber	NA	Non-native to India	HBJU279
	Solanaceae					
97.	<i>Datura innoxia</i> Mill.	May–October	Shrub	NA	Non-native to India, and native to tropical America	HBJU280
98.	<i>Datura metel</i> L.	March–December	Shrub	NA	Non-native to India, and native to tropical America	HBJU283
99.	<i>Datura stramonium</i> L.	June–November	Shrub	NA	Non-native, introduced from Europe	HBJU148
100.	<i>Physalis minima</i> L.	August–October	Herb	LC	Native to Palaeartic realm	HBJU195
101.	<i>Solanum americanum</i> Mill.	June–January	Herb	NA	Non-native to India, and native of tropical America	HBJU220
102.	<i>Solanum hazenii</i> Britton	January–December	Shrub	NA	Native to Palaeartic realm	HBJU221
103.	<i>Solanum torvum</i> Sw.	April–July	Shrub	NA	Non-native to India, and native of West Indies	HBJU222
104.	<i>Solanum villosum</i> Mill.	July–November	Herb	NA	Non-native to India	HBJU284
105.	<i>Solanum virginianum</i> L.	May–November	Herb	NA	Non-native to India	HBJU271
	Scrophulariaceae					
106.	<i>Buddleja crispa</i> Benth.	February–August	Shrub	NA	Native to Palaeartic realm	HBJU116
107.	<i>Verbascum thapsus</i> L.	June–October	Herb	NA	Non-native to India, native of Europe	HBJU274
	Bignoniaceae					
108.	<i>Jacaranda mimosifolia</i> D.Don	May–August	Tree	Vu	Non-native, introduced from America	HBJU167
109.	<i>Kigelia africana</i> (Lam.) Benth.	April–October	Tree	LC	Non-native, introduced from Europe	HBJU170
	Acanthaceae					
110.	<i>Dicliptera bupleuroides</i> Nees	May–July	Herb	NA	Native to Palaeartic realm	HBJU139
111.	<i>Justicia adhatoda</i> L.	June–September	Shrub	NA	Native to Palaeartic realm (Southeastern Asia)	HBJU169
112.	<i>Lepidagathis incurva</i> Buch.-Ham. ex D.Don	October–May	Herb	NA	Native to Palaeartic realm	HBJU173
	Verbenaceae					
113.	<i>Lantana camara</i> L.	January–October	Shrub	NA	Non-native and invasive to India, and native of tropical America	HBJU171
	Lamiaceae					
114.	<i>Ajuga macrosperma</i> Wall. ex Benth.	January–November	Herb	NA	Native to Palaeartic realm (Himalaya)	HBJU106
115.	<i>Colebrookea oppositifolia</i> Sm.	January–March	Shrub	NA	Native to Palaeartic realm (Himalaya)	HBJU128

	Botanical name	Phenology period	Habit	IUCN status	Nativity status	Voucher no.
116.	<i>Elsholtzia fruticosa</i> (D.Don) Rehder	August–October	Shrub	NA	Native to Palaearctic realm (Southeastern Asia)	HBJU158
117.	<i>Isodon rugosus</i> (Wall. ex Benth.) Codd	July–October	Shrub	NA	Native to Palaearctic realm	HBJU166
118.	<i>Leucas lanata</i> Benth.	August–September	Herb	NA	Non-native to India	HBJU176
119.	<i>Mentha longifolia</i> (L.) L.	May–November	Herb	LC	Non-native to India, native to Europe	HBJU181
120.	<i>Mentha spicata</i> L.	July–November	Herb	LC	Non-native to India, native to Europe	HBJU285
121.	<i>Micromeria biflora</i> (Buch.-Ham. ex D.Don) Benth.	January–December	Herb	NA	Native to Himalaya	HBJU182
122.	<i>Nepeta graciliflora</i> Benth.	June–August	Herb	NA	Native to Palaearctic realm (Southeastern Asia)	HBJU245
123.	<i>Ocimum americanum</i> L.	January–December	Shrub	NA	Non-native to India, and native of tropical America	HBJU287
124.	<i>Origanum vulgare</i> L.	July–December	Herb	NA	Non-native to India, and native of Europe	HBJU252
125.	<i>Scutellaria scandens</i> D.Don	April–August	Herb	NA	Native to Palaearctic realm	HBJU215
126.	<i>Thymus vulgaris</i> L.	August–November	Herb	LC	Non-native to India, native to southern Europe	HBJU227
127.	<i>Vitex altissima</i> L.f.	June–November	Shrub	NA	Native to Palaearctic realm	HBJU235
	Plantaginaceae					
128.	<i>Plantago major</i> L.	June–September	Herb	LC	Non-native, introduced from Mediterranean and Africa	HBJU289
129.	<i>Plantago lanceolata</i> L.	May–August	Herb	Vu	Native to Palaearctic realm	HBJU198
	Nyctaginaceae					
130.	<i>Mirabilis jalapa</i> L.	June–November	Shrub	NA	Non-native to India, and introduced	HBJU242
	Amaranthaceae					
131.	<i>Achyranthes bidentata</i> Blume	July–October	Herb	NA	Non-native to India, and native to tropical Africa	HBJU109
132.	<i>Chenopodium album</i> L.	May–November	Herb	NA	Non-native, Introduced species from Mediterranean and Africa	HBJU122
	Polygonaceae					
133.	<i>Rumex hastatus</i> D.Don	April–June	Herb	NA	Native to Himalaya	HBJU261
	Lauraceae					
134.	<i>Neolitsea umbrosa</i> (Nees) Gamble	March–May	Tree	NA	Endemic to Himalaya	HBJU267
	Proteaceae					
135.	<i>Grevillea robusta</i> A.Cunn. ex R.Br.	March–August	Tree	NA	Non-native to India, and native of South Wales	HBJU241
	Euphorbiaceae					
136.	<i>Euphorbia helioscopia</i> L.	January–July	Herb	NA	Non-native to India	HBJU161
137.	<i>Euphorbia hirta</i> L.	June–December	Herb	NA	Non-native to India, and native to tropical America	HBJU162
138.	<i>Euphorbia neriifolia</i> L.	June–September	Shrub	NA	Non-native to India	HBJU179
139.	<i>Euphorbia prostrata</i> Aiton	April–October	Herb	NA	Non-native to India	HBJU192
140.	<i>Euphorbia royleana</i> Boiss.	May–July	Shrub	NA	Native to Himalaya	HBJU194
141.	<i>Mallotus philippensis</i> (Lam.) Müll. Arg.	March–August	Tree	NA	Native to Palaearctic realm	HBJU258
142.	<i>Ricinus communis</i> L.	June–December	Shrub	NA	Non-native to India	HBJU248
143.	<i>Sapium sebiferum</i> (L.) Roxb.	May–October	Tree	NA	Native to Himalaya	HBJU256
	Phyllanthaceae					
144.	<i>Glochidion heyneanum</i> (Wight & Arn.) Wight	June–November	Tree	NA	Native to Palaearctic realm	HBJU240
145.	<i>Leptopus cordifolius</i> Decne	May–August	Shrub	NA	Non-native to India	HBJU254

	Botanical name	Phenology period	Habit	IUCN status	Nativity status	Voucher no.
	Urticaceae					
146.	<i>Boehmeria macrophylla</i> Hornem.	June–January	Shrub	NA	Native to Palaeartic realm	HBJU114
147.	<i>Debregeasia longifolia</i> (Burm.f.) Wedd.	August–February	Shrub	NA	Native to Himalaya	HBJU137
148.	<i>Debregeasia saeneb</i> (Forssk.) Hepper & J.R.I.Wood	March–July	Shrub	NA	Non-native to India, and native of South America	HBJU150
149.	<i>Urtica dioica</i> L.	June–September	Herb	LC	Non-native to India	HBJU231
	Cannabaceae					
150.	<i>Trema politoria</i> (Planch.) Blume	May–October	Tree	NA	Native to Palaeartic realm	HBJU282
	Moraceae					
151.	<i>Ficus arnottiana</i> (Miq.) Miq.	March–November	Tree	NA	Native to Palaeartic realm	HBJU196
152.	<i>Ficus auriculata</i> Lour.	March–August	Tree	NA	Native to Palaeartic realm	HBJU197
153.	<i>Ficus benghalensis</i> L.	April–October	Tree	NA	Native to Palaeartic realm (India)	HBJU201
154.	<i>Ficus hispida</i> L.f.	June–October	Tree	NA	Native to Palaeartic realm (Southeastern Asia)	HBJU207
155.	<i>Ficus palmata</i> Forssk.	June–November	Tree	NA	Native to Himalaya	HBJU208
156.	<i>Ficus pumila</i> L.	May–November	Tree	NA	Native to Palaeartic realm	HBJU213
157.	<i>Ficus racemosa</i> L.	June–November	Tree	NA	Native to Palaeartic realm	HBJU214
158.	<i>Ficus religiosa</i> L.	May–August	Tree	NA	Native to Palaeartic realm	HBJU216
159.	<i>Ficus sarmentosa</i> Buch.-Ham. ex Sm.	May–September	Shrub	NA	Native to Palaeartic realm (China)	HBJU174
160.	<i>Ficus semicordata</i> Buch.-Ham. ex Sm.	May–October	Tree	NA	Native to Palaeartic realm (Himalaya)	HBJU234
161.	<i>Morus alba</i> L.	April–August	Tree	NA	Non-native to India	HBJU219
162.	<i>Morus macroura</i> Miq.	March–May	Tree	NA	Native to Palaeartic realm (Himalaya)	HBJU266
	Ulmaceae					
163.	<i>Holoptelea integrifolia</i> (Roxb.) Planch.	May–October	Tree	NA	Native to Palaeartic realm	HBJU189
	Juglandaceae					
164.	<i>Engelhardtia spicata</i> Lechen ex Blume var. <i>integra</i> (Kurz) Manning ex Steenis	January–December	Tree	LC	Endemic to Himalaya	HBJU143
	Fagaceae					
165.	<i>Quercus oblongata</i> D.Don	March–October	Tree	NA	Native to Himalaya	HBJU243
	Salicaceae					
166.	<i>Flacourtia indica</i> (Burm.f.) Merr.	January–July	Tree	NA	Native to Palaeartic realm	HBJU237
	GYMNOSPERMS					
	Pinaceae					
167.	<i>Pinus roxburghii</i> Sarg.	October–November	Tree	LC	Native to Himalaya	HBJU270
	MONOCOTS					
	Cannaceae					
168.	<i>Canna indica</i> L.	September–October	Herb	NA	Non-native to India	HBJU147
	Zingiberaceae					
169.	<i>Hedychium spicatum</i> Sm.	June–November	Herb	NA	Native to Palaeartic realm (China)	HBJU186
	Dioscoreaceae					
170.	<i>Dioscorea biloba</i> (Phil.) Caddick & Wilkin	August–November	Climber	NA	Native to Palaeartic realm (Southeast India)	HBJU154
171.	<i>Dioscorea bulbifera</i> L.	July–November	Climber	NA	Native to Himalaya	HBJU141
	Smilacaceae					
172.	<i>Smilax aspera</i> L.	June–November	Climber	NA	Native to Palaeartic realm	HBJU262

	Botanical name	Phenology period	Habit	IUCN status	Nativity status	Voucher no.
	Asparagaceae					
173.	<i>Agave americana</i> L.	April–October	Shrub	NA	Non-native, introduced from Mexico	HBJU104
174.	<i>Asparagus adscendens</i> Roxb.	October–December	Climber	NA	Native to Palaeartic realm	HBJU142
175.	<i>Asparagus racemosus</i> Willd.	October–January	Climber	NA	Native to Palaeartic realm (Himalaya)	HBJU108
	Colchicaceae					
176.	<i>Colchicum luteum</i> Baker	February–May	Herb	NA	Endemic to Himalaya	HBJU152
	Commelinaceae					
177.	<i>Commelina benghalensis</i> L.	May–October	Herb	LC	Native to Palaeartic realm (Southeastern Asia)	HBJU130
178.	<i>Floscopa scandens</i> Lour.	March–May	Herb	LC	Native to Palaeartic realm	HBJU155
	Arecaceae					
179.	<i>Phoenix dactylifera</i> L.	June–September	Tree	NA	Non-native to India, native of northern Africa	HBJU230
	Araceae					
180.	<i>Colocasia esculenta</i> (L.) Schott	February–September	Herb	LC	Native to Palaeartic realm	HBJU138
181.	<i>Sauromatum venosum</i> (Dryand. ex Aiton) Kunth	April–July	Herb	LC	Non-native to India, native of Africa	HBJU257
	Alismataceae					
182.	<i>Sagittaria graminea</i> Michx.	June–November	Herb	LC	Native to Palaeartic realm	HBJU255
	Cyperaceae					
183.	<i>Cyperus cyperoides</i> (L.) Kuntze	April–December	Herb	LC	Non-native to India, native of southeastern Australia	HBJU310
184.	<i>Fimbristylis quinqueangularis</i> (Vahl) Kunth	August–October	Herb	LC	Non-native to India	HBJU312
185.	<i>Fimbristylis schoenoides</i> (Retz.) Vahl	January–December	Herb	LC	Non-native to India, native of Australia	HBJU311
186.	<i>Cyperus sanguinolentus</i> Vahl [= <i>Pycreus sanguinolentus</i> (Vahl) Nees]	July–December	Herb	NA	Non-native to India, and native to tropical Africa	HBJU205
	Poaceae					
187.	<i>Arundinella pumila</i> (Hochst. ex A.Rich.) Steud.	May–July	Herb	NA	Non-native to India, and native to western Africa	HBJU300
188.	<i>Brachiaria ramosa</i> (L.) Stapf	May–October	Herb	LC	Non-native to India	HBJU305
189.	<i>Capillipedium assimile</i> (Steud.) A.Camus	August–December	Herb	NA	Non-native to India	HBJU307
190.	<i>Chrysopogon fulvus</i> (Spreng.) Chiov.	June–October	Herb	NA	Non-native to India, and native to central Africa	HBJU303
191.	<i>Cynodon dactylon</i> (L.) Pers.	January–December	Herb	NA	Non-native to India, and invasive	HBJU134
192.	<i>Dactyloctenium aegyptium</i> (L.) Willd.	May–October	Herb	NA	Non-native to India, and native to South Africa	HBJU309
193.	<i>Dendrocalamus strictus</i> (Roxb.) Nees	November–June	Tree	NA	Native to Palaeartic realm (Southeastern Asia)	HBJU153
194.	<i>Eragrostis atrovirens</i> (Desf.) Trin. ex Steud.	May–September	Herb	NA	Native to Palaeartic realm	HBJU298
195.	<i>Imperata cylindrica</i> (L.) Raeusch.	April–August	Herb	NA	Non-native to India, and native to tropical America	HBJU306
196.	<i>Isachne himalaica</i> Hook.f.	June–December	Herb	NA	Endemic to Himalaya	HBJU301
197.	<i>Oplismenus burmanni</i> (Retz.) P.Beauv.	July–October	Herb	NA	Native to Palaeartic realm	HBJU249
198.	<i>Oplismenus compositus</i> (L.) P.Beauv.	September–November	Herb	NA	Non-native to India, and native of North America	HBJU304
199.	<i>Paspalum scrobiculatum</i> L.	May–December	Herb	LC	Non-native to India	HBJU302
200.	<i>Paspalum vaginatum</i> Sw.	June–September	Herb	LC	Non-native to India, and native of western Australia	HBJU296
201.	<i>Cenchrus sieberianus</i> (Schtdl.) Verloove	July–September	Herb	LC	Non-native to India	HBJU297
202.	<i>Pogonatherum crinitum</i> (Thunb.) Kunth	May–September	Herb	NA	Non-native to India	HBJU308

	Botanical name	Phenology period	Habit	IUCN status	Nativity status	Voucher no.
203.	<i>Saccharum spontaneum</i> L.	July–September	Herb	LC	Native to Palaeartic realm (India)	HBJU291
204.	<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda	March–June	Herb	NA	Non-native to India and American origin	HBJU269
205.	<i>Brachiaria setigera</i> (Retz.) C.E.Hubb. [= <i>Urochloa setigera</i> (Retz.) Stapf]	July–September	Herb	NA	Non-native to India	HBJU299
	PTERIDOPHYTES					
	Selaginellaceae					
206.	<i>Selaginella</i> sp.	November–January	Herb	NA	-	HBJU259
	Adiantaceae					
207.	<i>Adiantum lunulatum</i> Burm.f.	January–April	Herb	NA	Native to Palaeartic realm (India)	HBJU117
208.	<i>Adiantum recurvatum</i> (D.Don) Fraser-Jenk.	December–April	Herb	NA	Native to Himalaya	HBJU121
	Pteridaceae					
209.	<i>Cheilanthes argentea</i> (S.G.Gmel.) Kunze	August–October	Herb	NA	Native to Palaeartic realm	HBJU129
210.	<i>Pteris linearis</i> Poir.	March–June	Herb	NA	Non-native to India, and native of Europe	HBJU238
211.	<i>Pteris vittata</i> L.	January–April	Herb	LC	Native to Palaeartic realm (China)	HBJU275
	Blechnaceae					
212.	<i>Woodwardia radicans</i> (L.) Sm.	July–September	Herb	NA	Non-native to India and native of Europe	HBJU293
	Aspleniaceae					
213.	<i>Asplenium dalhousiae</i> Hook.	August–November	Herb	NA	Native to Palaeartic realm	HBJU145

Note: NA—IUCN status not assessed | LC—Least Concern | Vu—Vulnerable | DD—Data Deficient | Native status worked out from Reddy et al. (2008).





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