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TREE DIVERSITY
OF WESTERN HIMALAYA

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Bhatt, D., Chandra Sekar, K., Rawal, R.S., Nandi, S.K. and Dhyani, P.P. (2016). *Tree Diversity of Western Himalaya*. G.B. Pant Institute of Himalayan Environment & Development, Almora, Uttarakhand, INDIA.

Acknowledgement

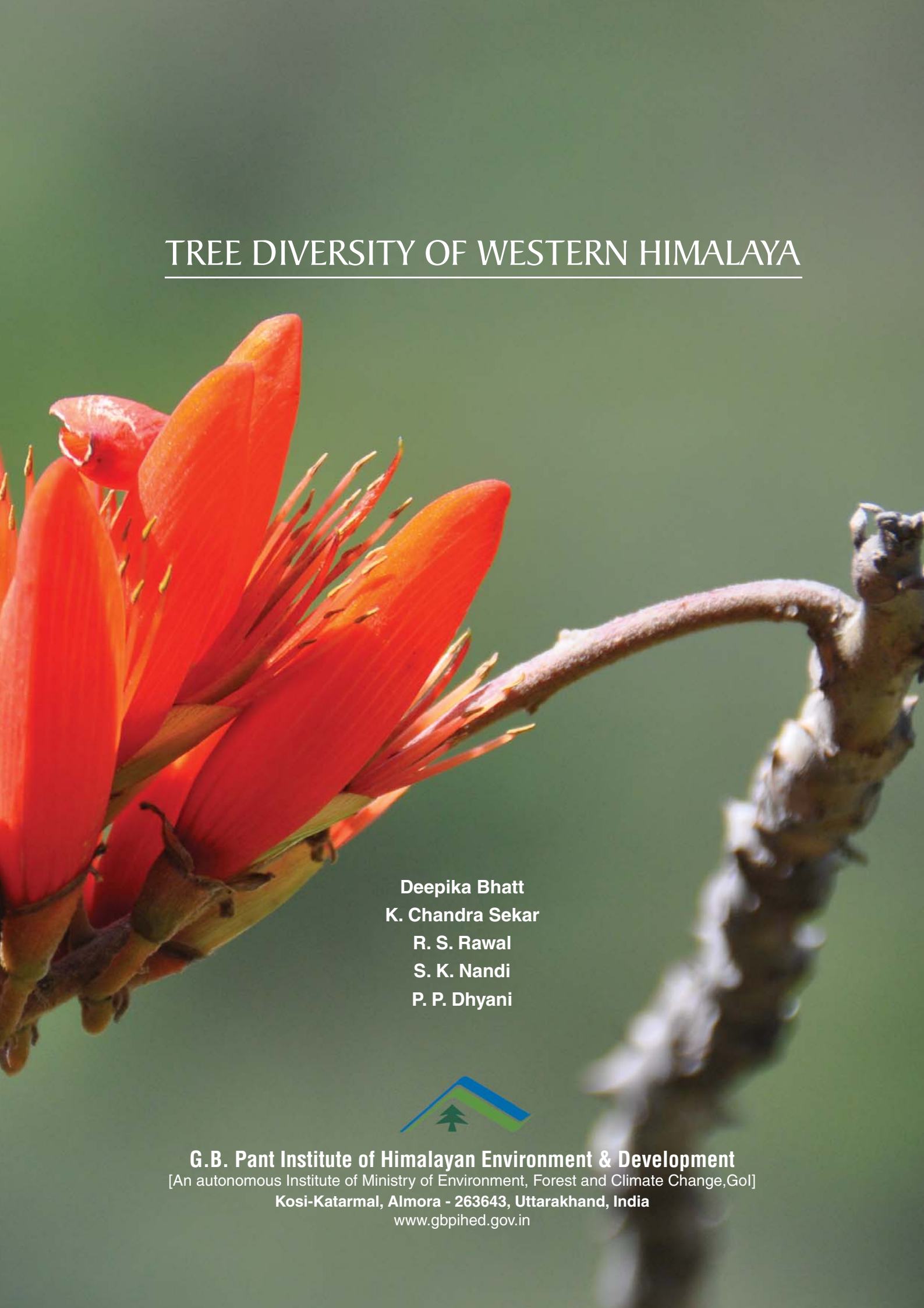
This book is an outcome of the financial support received from Department of Science and Technology (DST), Delhi, for implementation of Task Force- 3 (Forest Resources and Plant Biodiversity) under the National Mission for Sustaining the Himalayan Ecosystem (NMSHE). This support [DST/SPLICE/CCP/NMSHE/TF/GBPIHED/2014 (G), dated 2/09/14] is gratefully acknowledged. The information compiled under the scope of Mountain Division of the Institute has formed the base for developing the contents of this book. While preparing inventory of the Western Himalayan trees, information has been drawn from various sources. We acknowledge all such sources. The support received from Ms Dipti Dey and Ms Puja Bhojak, researchers at GBPIHED, during compilation and analysis of information is gratefully acknowledged.

The guidance and support from the Ministry of Environment, Forest & Climate Change (MoEF&CC) remained a constant source of inspiration all through this work.

Designed and Published for
Govind Ballabh Pant Institute of Himalayan Environment & Development
by **Highlanders Communications (P) Ltd.**

ISBN: 978-81-927373-7-9

TREE DIVERSITY OF WESTERN HIMALAYA



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Map of Western Himalaya (Figure 1) : Dr. Randeep Singh, Amity Inst. of Wildlife Science, Noida, Delhi

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FOREWORD

हेम पाण्डे, विशेष सचिव
Hem Pande, Special Secretary

The Indian Himalayan Region (IHR) with a geographical coverage of over 5.37 lakh km^2 constitutes a significantly large proportion of the Himalayan biodiversity hotspot and acts as life line for several million people living in the mountains and plains of the Indian subcontinent. The forest resources in this region have an important bearing on the ecological security and well-being of the country and its people through providing a bundle of goods and services. However, the increasing rates of deforestation and decline in plant diversity due to anthropogenic and environmental perturbations, particularly Climate Change have become an issue of national and global concern. Effective action to address forest resource degradation and plant biodiversity loss depends on understanding the current status of resources and addressing the underlying causes or indirect drivers of that decline.

The National Action Plan on Climate Change (NAPCC), among others recognizes the Himalayan ecosystem as vital for preserving the ecological security of the country. Hence, the area-specific mission, the National Mission for Sustaining the Himalayan Ecosystem (NMSHE) has been perceived and launched by the Government of India in 2010. The Mission envisages measures for sustaining and safeguarding the glaciers and mountain ecosystems. NMSHE is expected to offer practical adaptation strategies based on inputs received from various reputed institutions for the conservation of natural resources. The G.B. Pant Institute of Himalayan Environment and Development (GBPIHED), an autonomous institution of Ministry of Environment, Forest & Climate Change (MoEF&CC), has been identified as a Nodal Institute under NMSHE by the Department of Science and Technology (DST), for coordinating the Task Force on "Forest Resources and Plant Biodiversity". Among the various activities of this Task Force, one important aspect is strengthening of existing database on Himalayan ecosystems so as to enhance our ecological understanding vis-a-vis Climate Change, to address issues of conservation and management of the forests and plant diversity at local and/or regional level.

In the above context, I am pleased to note that GBPIHED is bringing out this book with a focus to provide comprehensive information on the diversity of tree species in Western Himalaya. The analysis provided in the book will be helpful in developing conservation and management strategies for the region. The Institute, especially the authors of this book, deserve appreciation for this timely initiative.

March, 2016

(Hem Pande)

PREFACE

पी.पी. ध्यानी, निदेशक
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The Indian Himalayan Region (IHR) forms a large part of Himalayan Biodiversity Hotspot (HBH), and acts as a repository of biological and cultural diversity. Biogeographically it comprises of three zones (i.e. Trans-Himalaya, Himalaya and NE region), and nine provinces. However, conventionally, it is more often divided into Western and Eastern Himalaya.

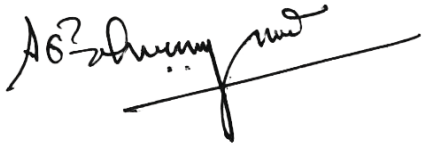
Western Himalaya, largely representing dry and cooler conditions, includes Jammu and Kashmir, Himachal Pradesh and Uttarakhand states, and recognized as one of the rich floristic regions of India. The region harbors many endemic and threatened plant species. The region is well recognized for diversity of its forests. These forests have remained source of livelihoods for a large proportion of the human population in the region. The indigenous communities are dependent on forests for wild edibles, medicine, fodder, fuelwood, agricultural implements, timber, industrial raw materials and several other non-timber forest products. However, the indiscriminate harvesting of biomass in recent decades has severely impacted on structure and composition of these forests. Therefore, regular inventorying of plant diversity and assessment of forest resources is needed to understand changing trends of plant populations in the face of anthropogenic and environmental disturbances. In this context, inventories of plant species forms the most common approach. Yet, most often, these inventories remain incomplete and/or fail to address needs of diverse stakeholder groups. Considering this gap, there is a felt need to have more effectively utilizable inventories.

While considering composition of the forests, tree species diversity is most important ingredient. Trees are recognized as most precious gift of nature and the savior of our planet. Besides enormous economic benefits, trees provide us with unmatched environmental services, including as source of oxygen and sink of carbon-dioxide.

The Department of Science & Technology (DST) coordinated National Mission for Sustaining the Himalayan Ecosystem (NMSHE) underlines intense vulnerability of Himalayan Ecosystem towards both anthropogenic and environmental perturbations. Among others, the mission considers poor availability of systematic long term datasets on the forest resources and plant diversity in IHR as severely limiting factor to objectively define the intensity of impacts and develop mitigation and adaptation strategies against the emerging reality of Climate Change. Therefore, a special task force on "Forest Resources and Plant Biodiversity" (NMSHE - Task Force 3) has been conceptualized for implementation. The major goal of the task force is to strengthen existing databases on Himalayan forest resources and plant diversity so as to enhance our ecological understanding vis- a- vis Climate Change to facilitate conservation and management of these vital resources.

As part of one of the Task Force-3 objectives- "Development of coherent database for forest resources and plant diversity of Indian Himalayan Region", this book has been prepared. It attempts to provide a comprehensive information on tree species of Western Himalaya.

This book includes an inventory of 490 tree species. Of these, 372 species are represented in wild and 118 as cultivated/ planted. Among, representative states in Western Himalaya, Uttarakhand (454 species, 345 wild, 109 cultivated) emerges as most tree species rich state. The richness of the tree species declines towards further west in the region (HP- 390 species; J&K- 330 species). Besides inventory, selected threatened and/or otherwise important tree species have been described in details. Also, an analysis of tree diversity has been made to describe various patterns. For the benefit of common readers, the taxa have been arranged alphabetically, providing correct binomial followed by name of the family, vernacular name, brief description, phenology, distribution, habitat, leaf characteristic, status, uses, nativity and threats. I hope, this book will serve the needs of diverse stakeholder groups within and outside the Himalaya.



March, 2016

(P.P. Dhyani)

CONTENTS

Introduction

The magnificent Himalaya is well recognized for its bio-physical diversity and socio-cultural heritage. It forms one of the Global Biodiversity Hotspots- the Himalayan Biodiversity Hotspot (HBH). The Indian Himalayan Region (27°50'-37°06'N and 72°30'-97°25'E), which forms largest part of HBH, includes ten states of India completely (i.e., Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram, Tripura), and two states partially (i.e., hill districts of Assam and West Bengal). With an area of approximately 5,31,250 km^2, IHR broadly forms the northern boundary of India. Starting from foot-hills in the south (Siwaliks) the region extends up to Tibetan Plateau in the north (trans-Himalaya). It contributes about 16.2% of India's total geographical area (Anonymous, 2012) and most of IHR is represented with snow-clad peaks and dense forests.

As per the available reports, IHR harbors about 8,000 species of Angiosperms (40% endemics), 44 species of Gymnosperms (15.9% endemics), 600 species of Pteridophytes (25% endemics), 1,737 species of Bryophytes (32.5% endemics), 1,159 species of Lichens (11.2% endemics) and 6,900 species of Fungi (27.4% endemics) (Singh and Hajra, 1996). The richness of plant diversity in the region is often attributed to the influence of various bio-geographic regions like Irano-Turanian, Mediterranean, Indo-Chinese, Indian, Malesian, Eastern-Asiatic, Circumboreal, Australian, Amazonian, Brazilian, Andean, North-American and others (Brandis, 1906; Chatterjee, 1939; Samant and Dhar, 1997). Similarly, fauna in this region presents one of the richest assemblages in the Indian sub-continent. Many species such as Snow-leopard, Himalayan Brown Bear, Red Panda, Himalayan Lynx, Kashmir Stag, Himalayan Musk Deer, Yak, Himalayan Ibex, Himalayan Tahr and Himalayan bearded Vulture are unique to the region (Gujral and Sharma, 1996).

In spite of the fact that the IHR includes three bio-geographic zones and nine provinces, most often the biodiversity and socio-cultural systems in the region are described distinctly for Western and Eastern Himalaya.

Western Himalaya

It includes three states of India namely, Jammu and Kashmir, Himachal Pradesh and Uttarakhand (Figure: 1) and shows great variation in topography and climate. With relatively drier conditions, the region experiences severely cold winter season and an average annual rainfall of nearly 150cm. The region is gifted with a number of important perennial rivers such as the Ganga, the Yamuna, the Jhelum, the Chenab, the Indus, the Sindhu and the Beas. The region is known for its rugged topography and steep vertical gradient, and vegetation in the region varies greatly from low to high altitude as well as across north to south extent. The topographical and geographical details of three Western Himalayan States are provided below:

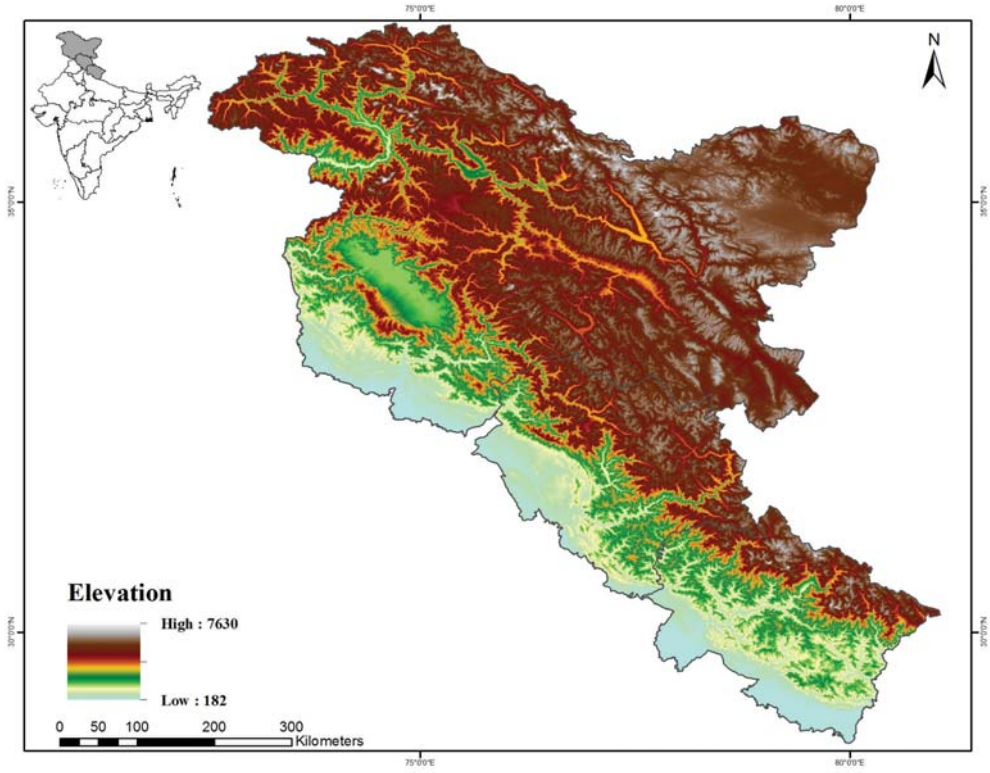


Figure 1: Western Himalaya (Location map)

(i) Jammu and Kashmir

The state of Jammu & Kashmir, with total geographic coverage of 222,236 km^2 (latitude 32°17' N to 37°05' N and longitude 72°31' E to 80°20' E), represents 41.6% of IHR. It is located in the north-west corner of the country, and has great strategic importance. The state shares its international borders with China in the east, Pakistan in the West, Afghanistan and Russia in the North and national boundaries with plains of Punjab and Himachal Pradesh in the south and south-east, respectively. Nearly 10% of state's geographic area is under forest cover. The important rivers of this state include the Indus, the Chenab and the Sutlej (Jhelum).

Topography and Geology:

The state extends 640 km in length (north to south) and over 480 km in breadth (east to west). Geographically, the state can be divided into four zones – the mountainous and semi mountainous plains known as Kandi belt, hills including Siwalik ranges, mountains of Kashmir valley and Pir Panjal range, and Tibetan tract of Ladakh and Kargil. There are extreme variations in climate in the state due to its location and topography. The climate of the state varies from tropical in Jammu plains to semi-arctic cold in Ladakh with Kashmir and Jammu mountainous tracts having temperate climatic conditions (Raina, 2012)

The Kashmir valley largely comprises of sedimentary, metamorphic and igneous rocks ranging in age from Salkhala (Precambrian) to recent. Outer hill division covering Jammu comprises of Siwalik, Murrees and Dogra Slates types of geological formations. Indus valley (Ladakh) comprises crystalline complex of rocks ranging in composition from sedimentary igneous and metamorphic in characteristics (Saqib and Sultan, 2013).

(ii) Himachal Pradesh

With an area of 55,673 km^2 (10.4% of IHR), Himachal Pradesh (latitudes 30°23' – 33°13' N and longitudes 75° 43' 79° 4' E) represents a predominantly mountainous State that is bounded by Uttarakhand on the southeast, Tibet (China) on the east, Punjab on the west and the southwest, Haryana on the south and Jammu & Kashmir on the north. It shares an international border with China. Important rivers of this state are the Chenab (Chandrabhaga), the Ravi (Iravati), the Sutlej (Shatadru), the Beas (Vipasa) and the Yamuna (Jamuna). Over 26% of the state is under forest cover (FSI, 2013).

Topography and Geology:

The altitude varies from 460m to 6,600m above mean sea level (amsl) resulting in diverse climate (from semi tropical in lower hills, to semi arctic in the cold deserts areas of Lahaul- Spiti and Kinnaur). Topographically, the state can be divided into three zones: (1). The Siwaliks or Outer Himalaya: composed of recent Alluvium rocks such as sandstone, shale and clay that came into existence during the Eocene, Miocene and Pliocene period. Siwaliks covers the lower hills of Kangra, Hamirpur, Una, Bilaspur, lower parts of Mandi, Solan and Sirmour districts. Within this zone, altitude varies from 350 to 1500m amsl; (2). Inner Himalaya or mid-mountains: represented by Jatog group of rocks (unclassified Granites) originated in middle Proterozoic period. Altitudinally this ranges from 1500 to 4500m amsl and includes areas such as the upper parts of Pachhad and Renuka in Sirmaur district, Chachiot and Karsog tehsils of Mandi district and upper parts of Churah tehsil of Chamba district; (3). Alpine zone or the greater Himalaya: consists of oldest rocks of granites which dates back to a stage of the crust at a time when India was located 8000 Km southwest of its present position, at an altitude above 4500m amsl and comprises of Kinnaur district, Pangi tehsil of Chamba district and area of Lahaul & Spiti districts (Aswal and Mehrotra,1994; Joshi, 2006).

(iii) Uttarakhand

Uttarakhand with a geographical area of 53,483 Km^2 (latitudes 28°43' – 31°27' N and longitudes 77° 34' – 81° 02' E) is separated from Himachal Pradesh in the north-west by the river Tons, whereas the river Kali separates it from Nepal in the east. Foot-hills in the south are bounded by Uttar Pradesh. Two of India's mightiest rivers, the Ganga and the Yamuna take birth in the state, and are fed by a myriad of lakes, glacial melts and streams in the region. The state has over 45.8% forest cover (FSI, 2013).

Topography and Geology:

With an altitudinal range from 200 to over 8,000m asl, the state comprises of five lithotectonically and physio-graphically distinct subdivisions, namely, the outer Himalaya comprising of Terai and Bhabhar, sub-Himalayan belt of the Siwaliks, the lesser Himalaya, the great Himalaya, and the trans-Himalaya or the Tethys. This geo-dynamically crucial region occupies within its expanses from foothills to Tibetain border, all the five physiographic- litho-tectonic sub-divisions (Burrard *et al.*, 1933; Kharkwal, 1971; Valdiya, 1978,1979, 1980) revealing the entire gamete of rock formations from the pre-cambarin basement complex to the late cretaceous sedimentary mentle. Inscribed in this lithological succession is a full chronicle of sedimentation on the continual margin of the Indian shield and its deformation, magmatic-volcanic episodes and the tectonic evolution of the Himalayan Mountain (Valdiya, 1980). The climate varies considerably across the altitudinal range. The eastern edges of the state are subject to heavy rainfall while the western division remains relatively dry. However, in foothills and plains, the summers are extremely hot and humid (Valdiya, 1980).

Diversity of Trees: Analysis and Inventory

Tree Diversity

Trees, the major components of forested landscapes, are important for existence of life. They play major role in human sustenance by way of their production and protection function. Diversity and abundance of trees determines the composition of forests. Also, various tree species form important horticultural crops and garden plants. Forest and tree cover in India accounts for about 23.4% of its total geographic area, and India stands 10th in the list of most forested nations of the world. The IHR contributes nearly one third (32.1%) of India's total forest cover. Therefore, it assumes a significant position while describing forests of India. Larger proportion of IHR forest cover comes from NE states. The West Himalayan states together account for 25% of IHR's total forest area. However, the West Himalaya contributes significantly for diversity of forests and tree species.

Following various published and unpublished records for the Western Himalaya, a total of 490 tree species have been inventorized, out of which 372 species (Angiosperms: 354, Gymnosperms: 18) are found in wild conditions and 118 species (Angiosperms: 76, Gymnosperms: 42) as cultivated. Of the total recorded tree species in Western Himalaya, Uttarakhand represents 454 (92.6%) species [345 (92.7%) wild- Angiosperms-327, Gymnosperms-18; 109 (92.4%) cultivated- Angiosperms- 67, Gymnosperms-42], Himachal Pradesh 390 (79.6%) species [292 (78.80%) wild- Angiosperms-274, Gymnosperms-18; 97 (82.2%) cultivated- Angiosperms-64, Gymnosperms-33] and Jammu & Kashmir 330 (67.3%) species [238 (64%) wild- Angiosperms-220, Gymnosperms-18; 92 (78%) cultivated species- Angiosperms-59, Gymnosperms-33] (Figure 2).

Analysis of wild tree species diversity across various families suggests that Moraceae among angiosperms and Cupressaceae in gymnosperms is invariably the most species rich family across West Himalayan states. The details of tree species rich families in different states of Western Himalaya is presented (Table 1). Considering the diversity of cultivated/ planted tree species in the region, Myrtaceae and Rosaceae among angiosperms and Cupressaceae among gymnosperms emerged as most species rich families. Details of other species rich families in different Western Himalayan states are summarized (Table 2).

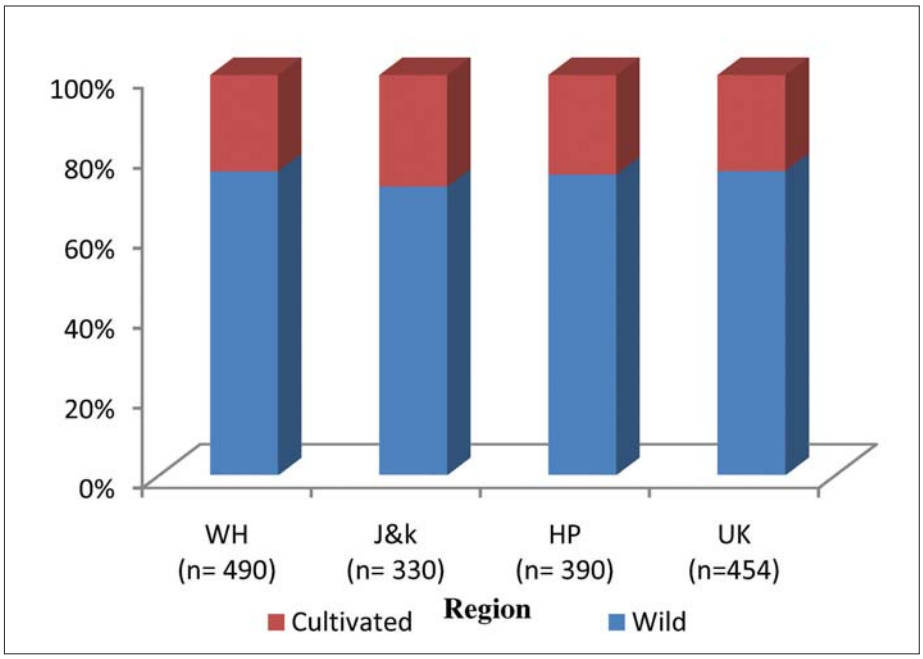


Figure 2 : Proportional representation of wild & cultivated tree species in Western Himalaya

(WH- Western Himalaya, J&K- Jammu and Kashmir, HP- Himachal Pradesh, UK- Uttarakhand)

Table 1: Wild tree species rich families in different states of Western Himalaya

Himachal Pradesh	Jammu & Kashmir	Uttarakhand
Angiosperms		
Moraceae (18)	Moraceae (15)	Moraceae (26)
Lauraceae (15)	Anacardiaceae (12)	Lauraceae (21)
Anacardiaceae, Euphorbiaceae, Mimosaceae (12 each)	Mimosaceae (11)	Euphorbiaceae (15)
Rubiaceae (11)	Lauraceae (10)	Mimosaceae (14)
Aceraceae, Fagaceae, Ulmaceae (10 each)	Aceraceae, Caesalpiniaceae, Rubiaceae, Ulmaceae (8 each)	Rubiaceae (12)
Caesalpiniaceae, Oleaceae, Salicaceae (9 each)	Fabaceae, Rutaceae (7 each)	Anacardiaceae, Oleaceae (11 each)
Tiliaceae (8)	Betulaceae, Combretaceae, Cornaceae, Euphorbiaceae, Rhamnaceae, Rosaceae (6 each)	Aceraceae, Tiliaceae (10 each)
Betulaceae, Fabaceae, Rhamnaceae, Rutaceae (7 each)	Caprifoliaceae, Fagaceae, Meliaceae, Oleaceae, Salicaceae (5 each)	Fagaceae, Rosaceae (9 each)
Gymnosperms		
Cupressaceae (9)	Cupressaceae (9)	Cupressaceae (9)
Pinaceae (8)	Pinaceae (8)	Pinaceae (8)
Taxaceae (1)	Taxaceae (1)	Taxaceae (1)

Table 2: Cultivated tree species rich families in different states of Western Himalaya

Himachal Pradesh	Jammu & Kashmir	Uttarakhand
Angiosperms		
Myrtaceae, Rosaceae (9 each)	Rosaceae (8)	Myrtaceae, Rosaceae (10 each)
Rutaceae (6)	Myrtaceae, Rutaceae (6 each)	Rutaceae (6)
Fabaceae, Magnoliaceae (5 each)	Fabaceae, Magnoliaceae (5)	Fabaceae, Magnoliaceae (5 each)
Salicaceae (4)	Bignoniaceae, Moraceae, Salicaceae (3 each)	Bignoniaceae, Moraceae, Elaeocarpaceae, Salicaceae (3 each)
Gymnosperms		
Cupressaceae (14)	Cupressaceae (14)	Cupressaceae (14)
Arucariaceae, Podocarpaceae, Taxodiaceae (4 each)	Arucariaceae, Podocarpaceae, Taxodiaceae (4 each)	Pinaceae (12)
Pinaceae (3)	Pinaceae (3)	Arucariaceae, Podocarpaceae, Taxodiaceae (4 each)

Altitude patterns of tree species distribution

Towards understanding the wild tree species diversity patterns along the altitudinal range, distribution of trees in the six altitudinal belts (<1000, 1001-1500, 1501-2000, 2001-2500, 2501-3000, >3000) has been analyzed. While considering the altitudinal patterns of tree species, West Himalaya exhibits a continuous trend of decline in number from low altitude zone (< 1000m amsl) to highest altitude zone (> 3000m amsl). Of the total (i.e., 372 species), over 66.6% tree species are represented in <1000m altitude zone. Whereas only 4.30% (17 species) are present in zone >3000m altitude. The patterns of proportional tree species distribution across various altitude zones are more or less similar for different Western Himalayan states (Table 3; Figure 3).

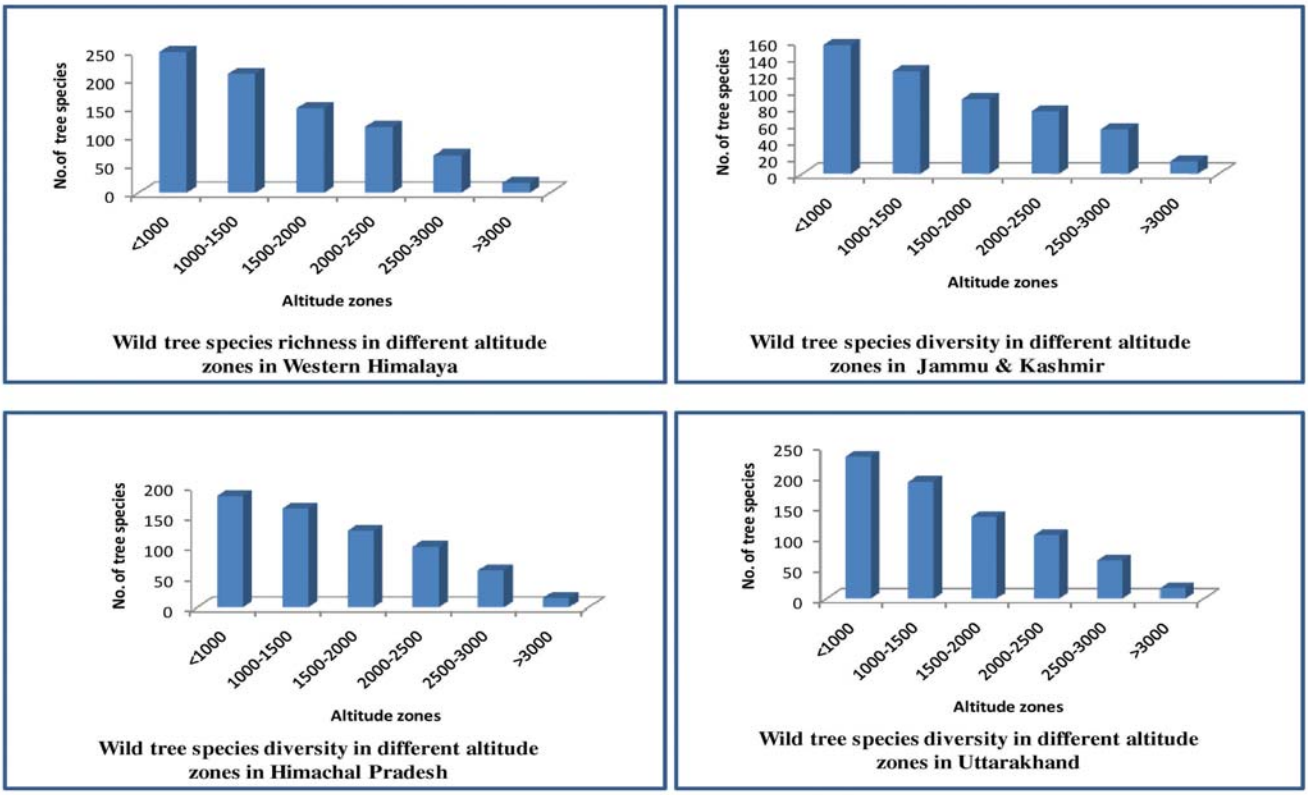


Figure 3: Altitudinal patterns of tree species richness in Western Himalaya

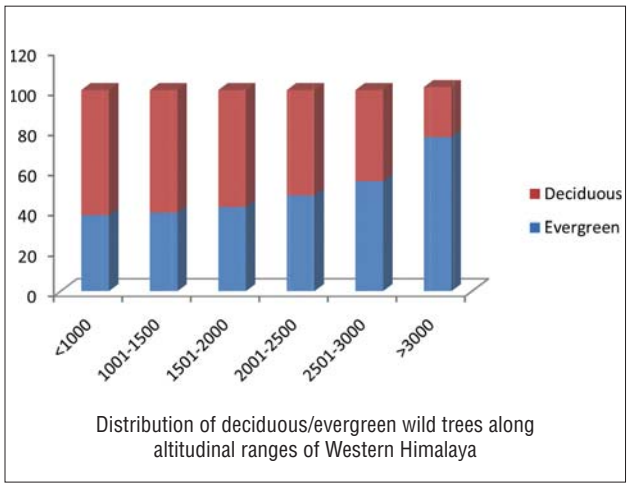
Table 3: Wild tree species richness in different altitude zones

	<1000	1001-1500	1501-2000	2001-2500	2501-3000	>3000	Total
WH	248 (66.7)	209 (56.8)	149 (40.0)	116 (31.8)	66 (17.7)	17 (4.5)	372
J&K	155 (65.1)	123 (51.6)	90 (37.8)	75 (31.5)	53 (22.2)	15 (6.3)	238
HP	184 (62.7)	163 (55.6)	126 (43.0)	100 (34.1)	61 (20.8)	15 (5.1)	293
UK	233 (67.5)	192 (55.6)	134 (38.8)	104 (30.1)	63 (18.2)	17 (4.9)	345

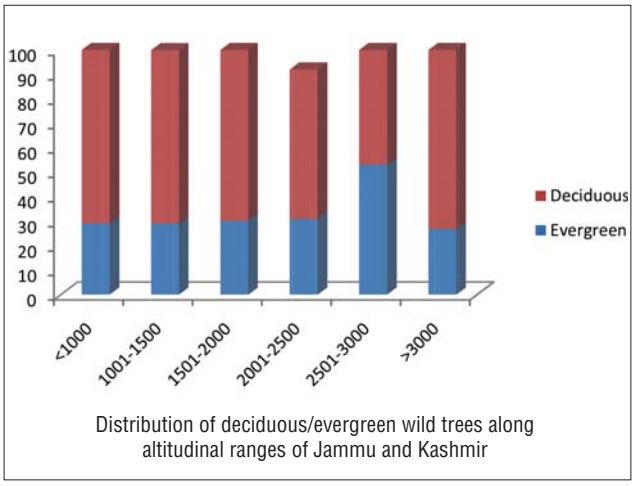
(Values in parenthesis indicate percent of total species)

Patterns of Evergreen and Deciduous trees

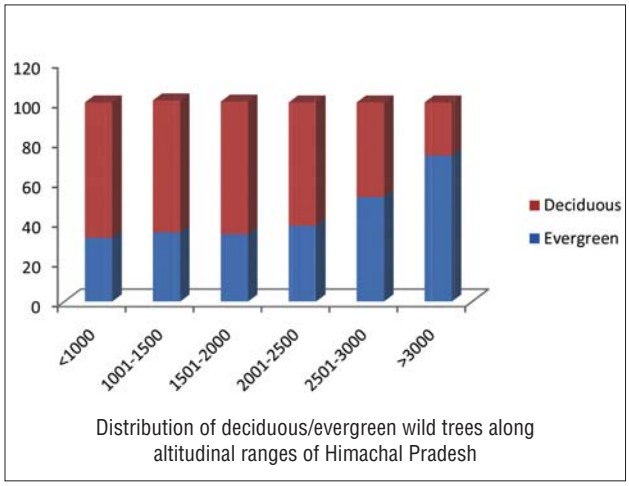
Table 4 includes the information on richness of Western Himalayan tree species under deciduous and evergreen categories. As apparent, > 60% of tree flora in Western Himalaya comprises of deciduous species. Proportionally, the deciduous elements increase from east (Uttarakhand) to west extent (J&K). Considering richness of evergreen and deciduous species across altitude range, it is revealing that deciduous tree species have greater share (52.6-62.5%) in altitude zones up to 2001-2500m amsl. Thereafter, richness proportion of evergreen species is higher (54.5-76.5%). The patterns of proportionate deciduous and evergreen tree species in different altitude zones across Western Himalaya and in different WH states is depicted (Table 5; Figure 2). While comparing the Western Himalayan states, it was revealing that in Uttarakhand proportion of evergreen tree species exceeds the deciduous from the altitude zone 2001-2500m. Whereas in other two cases it was true for only highest two altitude zones (i.e., 2501-3000 and >3000 m amsl). This can be attributed to greater eastern Himalayan influence in Uttarakhand.



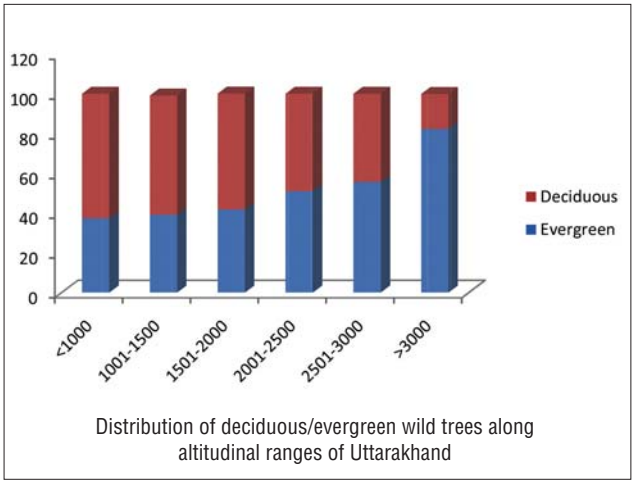
Distribution of deciduous/evergreen wild trees along altitudinal ranges of Western Himalaya



Distribution of deciduous/evergreen wild trees along altitudinal ranges of Jammu and Kashmir



Distribution of deciduous/evergreen wild trees along altitudinal ranges of Himachal Pradesh



Distribution of deciduous/evergreen wild trees along altitudinal ranges of Uttarakhand

Figure 4: Patterns of evergreen and deciduous trees along altitude zones

Table 4: Diversity of Deciduous/ Evergreen wild trees in Western Himalaya

	Total	Deciduous (%)	Evergreen (%)
WH	372	225 (60.5)	147(39.5)
J&K	238	158(66.4)	80 (33.6)
HP	293	189(64.5)	104 (35.5)
UK	345	207(60.0)	138 (40.0)

Table 5: Distribution of Deciduous / Evergreen trees along the altitudinal ranges

Region	<1000		1001-1500		1501-2000		2001-2500		2501-3000		>3000	
	D	E	D	E	D	E	D	E	D	E	D	E
WH	155 (62.5)	93 (37.5)	128 (61.2)	81 (38.8)	87 (58.4)	62 (41.6)	61 (52.6)	55 (47.4)	30 (45.5)	36 (54.5)	4 (25)	13 (76.5)
J&K	110 (71)	45 (29)	88 (70.9)	36 (29)	63 (70)	27 (30)	46 (61.3)	29 (30.7)	25 (47.2)	28 (52.8)	4 (26.7)	11 (73.3)
HP	125 (68)	59 (32)	108 (66.3)	55 (34.7)	84 (66.7)	42 (33.3)	62 (62)	38 (38)	29 (47.5)	32 (52.5)	4 (26.7)	11 (73)
UK	146 (62.7)	87 (37.3)	117 (60)	75 (39.1)	78 (58.4)	56 (41.7)	51 (49)	53 (51)	28 (44.4)	35 (55.6)	3 (17.6)	14 (82.3)

Floristic Similarities

Tree flora of three Western Himalayan states exhibits high similarity (68.2- 96.2). However, while moving from eastern to western extent of Western Himalaya, the similarity in tree flora declines (Uttarakhand vs J&K- 68.4% wild, 82.2% cultivated). This is reflected in the similarity matrix (Table 6,7).

Table 6: Wild tree flora similarity in Western Himalayan States

	J&K	HP	UK
J&K	100	96.2	68.4
HP		100	76.8
UK			100

Table 7: Cultivated tree flora similarity in Western Himalayan States

	J&K	HP	UK
J&K	100	96.7	82.2
HP		100	81.2
UK			100

Diversity of Uses

The trees in Western Himalaya are being used for diverse purposes. Out of total 490 tree species, 100 species are used as fodder, 62 as fuel, 34 as medicinal purposes, 22 as timber. Further details of species used in different categories are given in Figure 5.

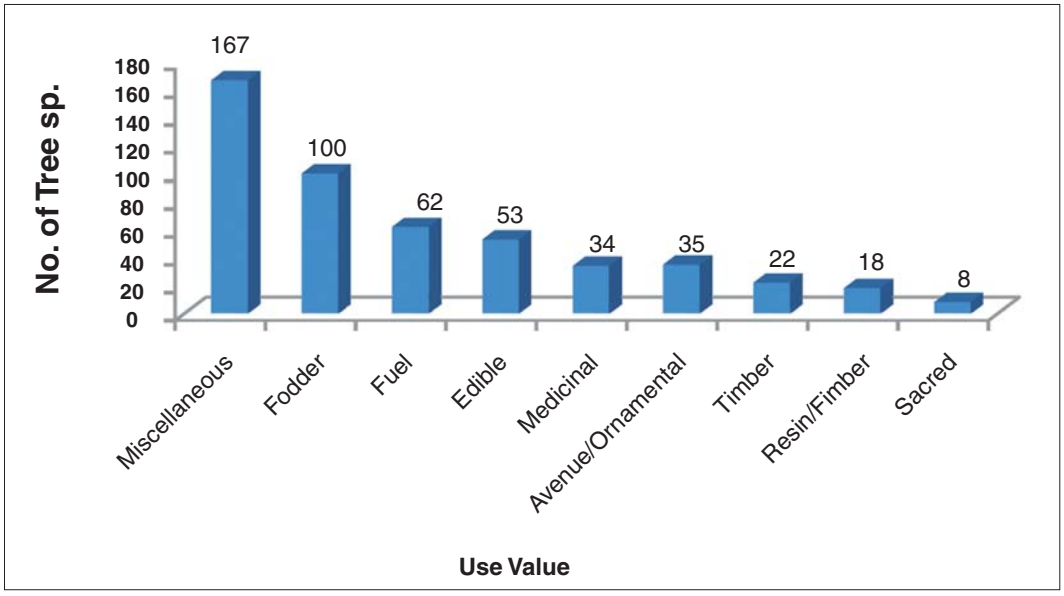


Figure 5 : Tree species diversity in different use categories in Western Himalaya

Threatened Tree Species

As per IUCN (International Union for Conservation of Nature and Natural Recourses), 32 tree species of West Himalaya are under threats of various categories. However, most of these (23) are in least concern category [*Abies pindrow* (Royle *ex* D. Don) Royle, *Alnus nepalensis* D. Don, *Alnus nitida* (Spach) Endl., *Alstonia scholaris* (L.) R. Br., *Bauhinia purpurea* L., *Betula alnoides* Buch.-Ham. *ex* D. Don, *Carpinus viminea* Wall. *ex* Lindl., *Cupressus torulosa* D. Don, *Engelhardtia spicata* Lechen. *ex* Blume, *Juniperus communis* L., *Juniperus indica* Bertol., *Juniperus recurva* Buch.-Ham. *ex* D. Don, *Juniperus semiglobosa* Regel, *Juniperus squamata* Buch.-Ham. *ex* D.Don, *Magnolia champaca* (L.) Baill. *ex* Pierre, *Magnolia hodgsonii* (Hook. f. & Thomson) H. Keng, *Picea smithiana* (Wall.) Boiss., *Pinus kesiya* Royle *ex* Gordon, *Pinus roxburghii* Sarg., *Pinus wallichiana* A. B. Jacks., *Podocarpus neriifolius* D. Don, *Pongamia pinnata* (L.) Pierre, *Shorea robusta* Gaertn. f.]. Other species in different threat categories are listed in Table 8.

Table 8: IUCN listed threatened tree species of Western Himalaya (2015)

S. No.	Data deficient	Endangered	Vulnerable	Near threatened
1	*Magnolia doltsopa* (Buch.-Ham. *ex* DC.) Figlar *(Michelia doltsopa* Buch.-Ham. *ex* DC.)	*Pittosporum eriocarpum* Royle	*Betula utilis* D. Don	*Abies spectabilis* (D.Don) Spach
2	*Magnolia kisopa* (Buch.-Ham. *ex* DC.) Figlar *(Michelia kisopa* Buch.-Ham. *ex* DC.)	*Taxus wallichiana* Zucc.	*Saraca asoca* (Roxb.) Willd.	*Cupressus cashmeriana* Royle *ex* Carr.
3	*Mangifera indica* L.			

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Table 9: Wild trees of Western Himalaya: Angiosperms

S.No.	Species	Distributional in West Himalaya			Uses									Altitudinal Range in metre (m)	Distribution	Flowering	Fruiting	Tree Habit
		HP	J&K	UK	T	M	F	Fu	Ed	A/o	R/F	S	M					
	ACERACEAE																	
1.	*Acer acuminatum* Wallich *ex* D.Don	√	√	√									+	2500- 3000	India, Nepal	Apr- May	Oct- Nov	D
2.	*Acer caesium* Wallich *ex* Brandis	√	√	√									+	2000-2500	India, Pakistan, Nepal	Mar- Apr	Oct- Nov	D
3.	*Acer cappadocicum* Gleditsch	√	√	√				+						2000-2500	India, China, Japan, Turkey	Mar- May	Dec- Feb	D
4.	*Acer caudatum* Wallich	√	√	√									+	2000- 2500	India, Bhutan, Nepal, Myanmar, China, Korea, Japan	Mar- May	Oct- Nov	D
5.	*Acer lavigatum* Wallich	√	√	√									+	1600- 1900	India, Nepal, Myanmar, China	Apr	Oct- Nov	D
6.	*Acer negundo* L.	√											+	1600- 1900	India, Nepal, Bhutan, China	May	Oct- Nov	D
7.	*Acer oblongum* Wallich *ex* DC.	√	√	√									+	1500-2000	India, Pakistan, China	Feb- Apr	Jan- Apr	E
8.	*Acer pectinatum* Wall. *ex* G. Nicholson			√									+	2700-3000	India, Nepal, China	May	Oct	D
9.	*Acer pentapomicum* Stewart *ex* Brandis	√	√	√									+	1500-2000	India, Pakistan, Afganistan	Feb- Apr	Apr- Jun	E
10.	*Acer thomsonii* Miq.	√		√									+	2100-2500	India, Bhutan, Nepal, China	Nov- Jan	Feb- Jul	D
11.	*Acer villosum* Wallich	√	√	√									+	2100-2500	India, Bhutan, Nepal, China	Mar- Apr	Oct- Nov	D
	ACTINIDIACEAE																	
12.	*Saurauja nepaulensis* Willd.	√		√	+									900-1800	India, Nepal, Myanmar, China, Thailand, China	Feb- Jun	May- July	E
	ALANGIACEAE																	
13.	*Alangium chinense* (Lour.) Harms	√					+							600-1000	India, Nepal, Bhutan, Myanmar, China, Malaysia	Mar- May	Jun-Jul	E
14.	*Alangium lamarckii* Thwaites	√	√	√			+							600-1000	India, Nepal, Bhutan, Myanmar, China, Malaysia	Mar- May	Jun-Jul	E
	ANACARDIACEAE																	
15.	*Buchanania cochinchinensis* (Lour.) Almeida	√	√	√	+									up to 1300	India, Myanmar	Jan- Mar	Mar- May	E
16.	*Lannea grandis* (Dennst.) Engl.=*Odina wodier* Roxb.	√	√	√				+					+	up to 1200	India, Nepal, Bangladesh, Myanmar, Sri Lanka, Malesia, Pakistan	Mar- Apr	June- July	D
17.	*Pistacia chinensis* Bung.	√	√	√		+								600-1200	India, Afghanistan, Pakistan	Mar- Apr	Jun- Jul	D
18.	*Pistacia khinjuk* Stocks	√	√										+	600-1200	India, Pakistan, Afganistan	Jul- Sep	Sep- Nov	D
19.	*Rhus acuminata* DC.	√	√	√				+						1000-2000	India, Pakistan	May- July	Sep- Oct	D
20.	*Rhus cotinus* L.	√	√	√									+	1000-1600	India, China, Europe	Apr- Jun	Sep- Oct	D

21.	*Rhus punjabensis* J. L. Stewart *ex* Brandis	√	√	√				+						1000-2000	India, Pakistan	Apr- Jun	Jun- Sep	D
22.	*Rhus semialata* Murray	√	√	√				+						1000-2000	India, Nepal, China, Japan	May-Jun	Sep- Oct	D
23.	*Rhus succedanea* L.	√	√	√				+						1000-2000	India, Pakistan and Nepal	May-Jun	Sep- Oct	D
24.	*Rhus wallichii* Hook.f.	√	√	√									+	1000-2000	India, Pakistan and Nepal	May- Jul	Sep- Oct	D
25.	*Semecarpus anacardium* L.f.	√	√	√									+	up to 1000	India, Myanmar, Singapore, Malaya, China, Africa	Jun- Sep	Feb- Mar	D
26.	*Spondias pinnata* (L.f.) Kurz	√	√	√					+					up to 1400	India, Nepal, Thailand, Sri Lanka, Malaysia	Apr- Jun	June- Dec	D
	ANNONACEAE																	
27.	*Annona squamosa* L.	√	√	√					+					up to 1000	India, Nepal, Bhutan, Bangladesh, Myanmar	May- Aug	Sep-Jan	E
28.	*Miliusa tomentosa* Finet & Gagnep.		√	√	+									up to 800	India, Pakistan, Nepal, Sri Lanka	Mar- May	May- Jul	D
29.	*Miliusa velutina* (Dunal) Hook. f. & Thomson		√	√	+									up to 900	India, Myanmar, India, Nepal	Apr- Jun	Jun-Jul	D
30.	*Polyalthia longifolia* (Sonnerat) Thwaites	√	√	√						+				up to 1000	India, Pakistan, Malaya, Sri Lanka and Tropical East Africa.	Mar- May	Jul- Sep	E
	APOCYNACEAE																	
31.	*Holarrhena antidysenterica* (L.) Wall. *ex* A. DC.	√	√	√		+								up to 900	India, Pakistan	May- June	Feb- Mar	D
32.	*Wrightia arborea* (Dennst.) Mabb.	√	√	√									+	up to 1200	India, Srilanka, Myanmar, Thailand, China	May- Jun	Mar	D
33.	*Wrightia tinctoria* R.Br.	√		√									+	up to 1400	India, Pakistan, Myanmar	May- Jun	Mar	D
	AQUIFOLIACEAE																	
34.	*Ilex dipyrena* Wallich	√	√	√			+							1500-3200	India, Pakistan, Nepal, Bhutan	Apr- May	Dec- Feb	E
35.	*Ilex excelsa* (Wallich) Hook.f.	√	√	√			+							1300-3000	India, Nepal and Bhutan	May- Jun	Dec- Mar	E
36.	*Ilex fragilis* Hook.f.	√	√	√			+							1500- 3000	India, Bhutan, Myanmar, China	Jun- Oct	Oct	E
37.	*Ilex odorata* Buch.- Ham *ex* D.Don	√	√	√			+							900-1500	India, Nepal, Myanmar, Bangladesh	Apr- May	May-Jun	E
	ARALIACEAE																	
38.	*Brassaiopsis aculeata* (Buch.- Ham. *ex* D.Don) Buch.- Ham *ex* Seem.			√										600-1800	India, Nepal, Bhitan	Jan-Mar	May- Jun	D
39.	*Heptapleurum impressum* Clarke			√		+								2100-3000	India,China, Bhutan	Sep	Dec- Jan	E
40.	*Heteropanax fragrans* (Roxb.) Seem			√			+							up to 1200	India, China, Bhutan	Nov- Dec	Feb	E
41.	*Macropanax oreophilus* Miq.		√	√									+	up to 1800	India, Bhutan, China, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam	Aug- Sep	Dec- Jan	D
	ASTERACEAE																	
42.	*Leucomeris spectabilis* Don.			√									+	800-1800	India, Nepal	Apr- May	May-Jun	E
	BETULACEAE																	
43.	*Alnus nepalensis* D.Don	√	√	√									+	1200- 2700	India, Bhutan, Pakistan, Nepal, Myanmar, China	Oct- Nov	Dec- Jan	D

44.	*Alnus nitida* (Spach) Endl.	√	√	√									+	1200- 2700	India, Pakistan, Afganistan, China, Nepal	Oct- Nov	May-Jun	D
45.	*Betula alnoides* Buch.-Ham *ex* D.Don	√	√	√									+	1600-2700	India, China, Bhutan, Nepal, Myanmar	Mar- Apr	May- Jun	D
46.	*Betula pendula* Roth.	√						+						1600-2700	India, Pakistan, Afganistan, China, Nepal	Mar- Apr	May- Jun	D
47.	*Betula utilis* D.Don	√	√	√				+						2700-3100	India, Bhutan, Nepal, Afghanistan, China	May	Oct- Nov	D
48.	*Carpinus faginea* Lindl.	√	√	√									+	1200- 2000	India, Bhutan, China, Myanmar	Mar- Apr	Oct-Nov	D
49.	*Carpinus viminea* Lindl.	√	√	√									+	1500-2500	India, Bhutan, China, Myanmar	Mar- Apr	Oct- Nov	D
	BIGNONIACEAE																	
50.	*Oroxylum indicum* (L.) Kurz.	√	√	√		+								up to 800	India, Indo-Malaya, Sri Lanka and South China	Jun- Jul	Jan- Mar	D
51.	*Stereospermum chelonoides* DC.	√	√	√	+									up to 1400	India, Sri Lanka, Myanmar, Java	May- June	Apr-Jun	D
	BOMBACACEAE																	
52.	*Bombax ceiba* L.	√	√	√									+	600- 1500	India,Pakistan, Sri Lanka, S.E.Asia, China, Australia	Jan-Mar	Apr-May	D
	BORAGINACEAE																	
53.	*Cordia dichotoma* Forst.	√	√	√									+	up to 1000	India, Pakistan, China, Taiwan, China, New Caledonia, Australia	Mar- Apr	Jun- Jul	D
54.	*Cordia obliqua* Willd.			√									+	up to 1500	India, Afganistan, Myanmar	Mar- Apr	Jun- Jul	D
55.	*Cordia vestita* Hook.f.	√	√	√									+	300-1200	Pakistan and India	Mar- Apr	Jun-Jul	D
56.	*Ehretia acuminata* R.Br.	√	√	√									+	up to 1800	India, Bhutan, China, Indonesia, Japan, Vietnam, Australia	Mar- Jun	Jun-Jul	D
57.	*Ehretia laevis* Roxb.	√	√	√									+	up to 1100	India, Pakistan, Iran, Myanmar and Hainan, Polynesia, China and Australia	Feb- Apr	Apr-May	D
	BURSERACEAE																	
58.	*Boswellia serrata* Roxb. *ex* Colebr.			√							+			300-900	India	Jan-May, Sep- Dec	Apr-Aug, Nov- Mar	D
59.	*Garuga pinnata* Roxb.			√	+									up to 1000	India, Pakistan and Philippines	Mar- Apr	Sep- Oct	D
	BUXACEAE																	
60.	*Buxus wallichiana* Baill	√	√	√									+	1300-3000	India, Afghanistan, Pakistan, Nepal and Bhutan	Mar- May	Jun- Aug	E
	CAESALPINIACEAE																	
61.	*Bauhinia malabarica* Roxb.	√	√	√			+							300-600	India, Nepal, Bhutan, Myanmar, Thailand, Laos, Cambodia, Vietnam, Phillipines, Indonesia	Aug- Oct	Jan- May	D
62.	*Bauhinia purpurea* L.	√	√	√			+							300-600	India, Pakistan, Sri Lanka, Myanmar, China, South East Asia	Sep- Nov	Jan- Mar	D
63.	*Bauhinia racemosa* Lam.	√	√	√			+							300-600	India, Pakistan, Sri Lanka, Myanmar, China	Mar- Jun	Jan- Feb	D
64.	*Bauhinia semla* Wunderlin (Buch.-Ham. *ex* Roxb.) Wunderlin	√	√	√			+							300-1800	India, Pakistan, Nepal	Sep- Nov	Apr- May	D
65.	*Bauhinia variegata* L.	√	√	√			+							300-600	India, Pakistan, Myanmar, China	Mar- May	Apr- May	D

66.	*Cassia fistula* L.	√	√	√		+								up to 1200	India, Pakistan, Myanmar and Sri Lanka	Apr- Jun	Apr- May	D
67.	*Cassia surattensis* Burm. f.	√	√	√									+	up to 600	India, Sri Lanka, Myanmar, Malesia, Indonesia, China, Taiwan, Australia, Africa, America	Apr- Jun	Jul- Aug	D
68.	*Cassia floribunda* Cav.	√	√		√								+	up to 600	India, Asia, America, Mexico to Brazil	Apr- Jun	Jul- Aug	D
69.	*Gleditsia triacanthos* L.	√											+	up to 900	India, North America	Apr- Jun	Jul- Aug	D
	CAPPARACEAE																	
70.	*Crateva adansonii* DC.		√	√								+		up to 1000	India, Nepal, Myanmar, China, Thailand, Philippines, Asia	Apr- May	Jul- Aug	D
	CAPRIFOLIACEAE																	
71.	*Viburnum cotinifolium* D. Don	√	√	√		+								1800-2500	India, Afghanistan, Pakistan	Apr- Jun	Aug- Oct	D
72.	*Viburnum cylindricum* Buch.-Ham *ex* D. Don	√	√	√			+							1800-2800	India, Pakistan, Nepal, Sri Lanka, Myanmar, Thailand, China, Malaysia.	Jun-Aug	Oct- Dec	E
73.	*Viburnum foetens* Decne.	√	√	√				+						up to 1700	India, Pakistan, Bhutan, China	Jun-Aug	Oct- Dec	D
74.	*Viburnum erubescens* Wall.	√	√	√				+						1300-2900	India, Pakistan, Nepal, China	Apr-Jun	Jun-Aug	D
75.	*Viburnum mullaha* Buch.-Ham *ex* D. Don	√	√	√				+						2000-2800	India, Vietnam, Bhutan, Pakistan, Myanmar, China	Jun-Aug	Oct- Dec	D
	CELASTRACEAE																	
76.	*Elaeodendron glaucum* Pers.			√									+	up to 1300	India, Pakistan, Sri Lanka and Malaysia	Jun	Jan- Apr	D
77.	*Eunonymus grandiflorus* Wall.	√		√			+							1000-2000	India, Nepal, Bhutan, Myanmar, China	Apr- Oct	Oct- Dec	D
78.	*Eunonymus hamiltonianus* Wall.	√	√	√				+						1700-2000	India, Afganistan, Pakistan, China, Japan	Mar- Jun	Oct- Nov	D
79.	*Eunonymus lacerus* Ham. Buch.-Ham. *ex* D.Don.	√		√			+							1900- 3000	India, Nepal, Bhutan	Apr- May	Oct	D
80.	*Eunonymus pendulus* Wall. *ex* Roxb.	√	√	√				+						2000-3000	India, Pakistan, Bhutan, Bangladesh	May- Jun	Nov- Feb	D
81.	*Eunonymus tingens* Wall.	√	√	√			+							2000-3000	India, China	Apr- Jun	Nov- Dec	D
	CLUSIACEAE																	
82.	*Mesua ferrea* L.			√									+	Up to 1500	India, Nepal, Bangladesh, Sri Lanka, Malaysia, Indonesia, Vietnam, Cambodia, Thailand, Malacca.	Jan-Mar	May- Oct	E
	COCHLOSPERMACEAE																	
83.	*Cochlospermum religiosum* (L.) Alston.		√	√						+				up to 1000	India, Srilanka, Vietnam, Cambodia, Thailand, Malaysia, Indonesia, Philippines	Jan- Mar	Mar-Jun	D
	COMBRETACEAE																	
84.	*Anogeissus latifolia* (Roxb. *ex* DC.) Wall. *ex* Bedd.	√	√	√									+	up to 1200	India, Sri Lanka	May-Jun	Feb- Mar	D
85.	*Terminalia arjuna* (Roxb. *ex* DC.) Wight & Arn.	√	√	√		+								up to 1400	India and Sri Lanka, Pakistan	Jun- Aug	Feb- Apr	D
86.	*Terminalia bellirica* (Gaertn.) Roxb.	√	√	√		+								up to 1200	India, Pakistan, Sri Lanka, Myanmar, Malayan Peninsula	Apr-Jun	Apr-May	D

87.	*Terminalia chebula* Retz.	√	√	√		+								up to 1600	India, Sri Lanka, Myanmar, Malayan Peninsula, Siam, Pakistan.	Apr-Jun	Jan- Mar	D
88.	*Terminalia myriocarpa* Heurck.& Muell.- Arg.	√	√	√									+	up to 1500	India, Bhutan, Myanmar	Oct- Nov	Jan- Feb	D
89.	*Terminalia tomentosa* (Roxb.) Wight & Arn.	√	√	√	+									up to 1400	India, Sri Lanka	Jun- Aug	Feb- Apr	D
	CORNACEAE																	
90.	*Benthamidia capitata* (Wallich *ex* Roxb.) Hara	√	√	√									+	1500-2500	India, Bhutan, China	Apr- Jun	Aug-Nov	E
91.	*Cornus capitata* Wallich	√	√	√					+					1500-2300	India, Bhutan	Jun-Jul	Oct- Nov	D
92.	*Cornus controversa* Hemsl.	√	√	√									+	1800- 2200	India, Bhutan, China, Myanmar, Nepal, North America	May-Jun	Sep- Oct	E
93.	*Cornus macrophylla* Wallich	√	√	√					+					1300-2300	India, China, Japan, Afghanistan, Pakistan	Apr-Jun	Oct- Feb	D
94.	*Cornus oblonga* Wallich			√									+	1200-2100	India, Pakistan, Nepal	Sep- Dec	Apr-May	E
95.	*Swida macrophylla* Wall.	√	√	√									+	1400-2500	India, Nepal, Bhutan, China, Korea, Japan	Apr- Jun	Jul- Oct	D
96.	*Swida oblonga* (Wall.) Sojak	√	√	√			+							1400-2500	India, Nepal, Bhutan, China, Korea, Japan	Sep- Oct	Jan- May	D
97.	*Toricellia tiliifolia* DC.			√									+	1500-2500	India	Apr	Oct	D
	DILLENIACEAE																	
98.	*Dillenia indica* L.		√	√				+						up to 800	India, Nepal, Sri Lanka, Burma, Pakistan, Bangladesh, Myanmar, Thailand, Cambodia, Vietnam and Malaysia	May- Aug	Sep- Feb	E
	DIPTEROCARPACEAE																	
99.	*Shorea robusta* Gaertn.	√	√	√	+									up to 1300	India, Nepal, China and Bhutan	Mar- May	May- Jul	D
	EBENACEAE																	
100.	*Diospyros cordifolia* Roxb.	√		√									+	300-600	India, Bhutan, Myanmar, China, Bangladesh, Nepal, Cambodia, Indonesia	Mar- May	Jan	D
101.	*Diospyros embryopteris* Pers.			√									+	up to 900	India, Burma, China, Pakistan	Mar- May	Jul- Aug	E
102.	*Diospyros exsculpta* Buch.- Ham	√		√									+	up to 900	India, Bhutan, Myanmar, China, Bangladesh, Nepal, Cambodia	Apr-May	May- Jun	D
103.	*Diospyros kanjilali* Duthie			√									+	300-600	India, Bhutan, Myanmar, China, Bangladesh, Nepal, SriLanka, Indonesia	Mar- May	Feb	D
104.	*Diospyros lotus* L.	√											+	300-600	India, Nepal, Bangladesh, Bhutan, Myanmar, China	Mar- May	Mar	D
105.	*Diospyros malabarica* (Desr.) Kostel	√	√	√							+			600-1200	India, Pakistan, Bhutan, India, China, Korea, Japan	Apr- May	May-Jun	D
106.	*Diospyros montana* Roxb.	√	√	√									+	300-1200	India, Sri Lanka, Australia	Apr- May	Jan	D
	ELAEAGNACEAE																	
107.	*Elaeagnus angustifolia* L.	√							+					2000-2700	India, Bangladesh, Myanmar, Laos, Nepal	Mar-Apr	May- Jul	E

108.	*Elaeagnus latifolia* L.	√											+	1200-2800	India, Bangladesh, Myanmar, Laos, Nepal, Bhutan	Mar-Apr	May- Jul	E
109.	*Hippophae salicifolia* Don.	√	√	√					+					1500-3200	India,Nepal, Bhutan, Myanmar, China	Apr- May	Oct- Mar	D
	ELAEOCARPACEAE																	
110.	*Sloanea sterculiacea* (Benth.) Rehder & Wilson			√				+						900-1500	India, Nepal, Bhutan, Bangladesh, Myanmar, China	Apr	Sep	E
	ERICACEAE																	
111.	*Lyonia ovalifolia* (Wallich) Drude	√	√	√			+							600-3300	India, Burma and Japan.	Apr- Jun	Jan- Feb	D
112.	*Rhododendron arboreum* Sm.	√	√	√									+	1200-3000	India, Pakistan, Nepal, China, Myanmar	Feb- Jun	June-Aug	E
	EUPHORBIACEAE																	
113.	*Bischofia javanica* Bl.	√		√									+	up to 2000	India, Bhutan, Bangladesh, Myanmar, Thailand, China, Malesi	Apr- May	Dec- Jan	D
114.	*Briedelia retusa* (L.) Adr. Juss.	√	√	√			+							1000-2000	India, Sri Lanka, Pakistan, Nepal, Bhutan, Bangladesh, Mayanmar, China, Sumatra	May- June	Jan- Feb	D
115.	*Briedelia verrucosa* Haines	√		√			+							up to 1200	India, Pakistan, Nepal, Bhutan	Jan- Apr	Apr- Oct	D
116.	*Daphniphyllum himalayense* (Benth.) Müll. Arg.	√		√									+	1500-3000	India, Nepal, Bhutan, Myanmar, China	Apr- May	Nov- Mar	E
117.	*Drypetes assamica* (Hook.f.) Pax & Hoffm	√	√	√									+	up to 1400	India, Bhutan, Bangladesh, Thailand, China	Jan- May	May- Dec	E
118.	*Glochidion ellipticum* Wight	√		√									+	up to 1800	India, Nepal, Bhutan, Bangladesh, Myanmar, Thailand, Vietnam, China	Jan- May	May- Dec	E
119.	*Macaranga denticulata* (Blume) Muell.- Arg.			√									+	up to 1200	India, Nepal, Bhutan, Bangladesh, Myanmar, China, Laos, Vietnam, Thailand, Malaysia, Sumatra, Java	Apr- May	Jul	E
120.	*Macaranga indica* Wight			√				+						up to 1600	India, Sri Lanka, Nepal, Bhutan, Bangladesh, Myanmar, China, Laos, Vietnam, Thailand, Malaysia, Sumatra, Java	Aug- Sep	Nov- Dec	E
121.	*Mallotus philippensis* (Lam) Mull.Arg.	√	√	√									+	up to 900	India, Sri Lanka, Taiwan, Asia, China	Sep- Nov	Mar- May	D
122.	*Phyllanthus emblica* L.	√	√	√					+					up to 1800	India, Pakistan, Sri Lanka, China and Malaysia	Mar-May	Nov- Jan	D
123.	*Phyllanthus indicus* (Dalz.) Mull.Arg.			√									+	up to 700	India, Sri Lanka, China, Taiwan, Vietnam, Thailand, Sumatra,	Mar- Apr	May- Jun	D
124.	*Putranjiva roxburghii* Wallich	√	√	√		+								up to 1000	India, Sri Lanka, China, Taiwan, Vietnam, Thailand, Sumatra,	Apr- May	Feb- Mar	E
125.	*Sapium insigne* (Royle) Benth. & Hook. f.	√		√									+	up to 2000	India, Sri Lanka, Nepal, Bhutan, Myanmar, Laos, Cambodia, Vietnam, China,Thailand, Malaysia	Feb- Mar	May	D
126.	*Sapium sebiferum* (L.) Dum. Cours.	√		√									+	up to 1000	India, China, Taiwan, Japan	Jun- Aug	Dec	D
127.	*Trewia nudiflora* L.	√	√	√									+	up to 1000	India, Srilanka,Nepal, Bhutan, Myanmar, Laos, Cambodia, Vietnam, China,Thailand, Malaysia	Feb- Apr	Nov- Dec	D

	FABACEAE																
128.	*Butea monosperma* (Lam) Taub.	√	√	√			+							up to 1200	India, Pakistan, Sri Lanka	Mar- Apr	Jun- Jul	D
129.	*Dalbergia lanceolaria* L.f.	√	√	√			+							300- 600	India, Sri Lanka, Myanmar	May- Jun	Feb- Ma	D
130.	*Dalbergia sericea* G.Don	√	√	√			+							600-1500	India, Nepal, Bhutan	Apr- May	Nov- Feb	D
131.	*Dalbergia sissoo* Roxb. *ex* DC.	√	√	√	+									up to 900	India, Pakistan, Afghanistan, India, Bangladesh, Bhutan, Myanmar, Iran, Iraq	Mar- May	Jan- Mar	D
132.	*Erythrina indica* Lam.	√	√	√									+	300-900	India, Sri Lanka, Myanmar, Malaysia	Mar- April	Sep- Oct	D
133.	*Erythrina suberosa* Roxb.	√	√	√									+	300-1200	India, Sri Lanka, Nepal, Myanmar, China, Pakistan	Mar- April	Sep- Oct	D
134.	*Ougeinia oojeinensis* Hochr.	√	√	√			+							300-1500	India, Nepal	Mar- May	May- Jun	D
135.	*Pterocarpus marsupium* Roxb.			√									+	up to 600	India	Jun- Aug	Aug- Sept	D
	FAGACEAE																	
136.	*Castanea sativa* Mill.	√											+	1500-2000	India, China, Japan, Europe, Turkey, Africa	Apr- May	May-Jul	D
137.	*Castanopsis tribuloides* (Sm.) A.DC.			√									+	900-2000	India, Myanmar, China	Jul-Dec	Aug- Oct	E
138.	*Quercus acutissima* Carruth			√				+						up to 1500	India, Myanmar, China, Indonesia	Jul-Sep	Sep- Nov	E
139.	*Quercus floribunda* Lindl. *ex* A. Camus	√		√			+							up to 2200	India, Myanmar, China, Nepal	Apr- May	Aug- Oct	E
140.	*Quercus glauca* Thunb.	√	√	√			+							900-2000	India, China, Japan.	Mar- Apr	Oct- Dec	E
141.	*Quercus ilex* L.	√	√	√									+	900-2000	India, Pakistan, Afghanistan.	Mar- Apr	Oct- Dec	E
142.	*Quercus lanata* J.E.Sm.			√			+							1800-2500	India, Pakistan, Afghanistan.	Mar- Apr	Oct- Dec	E
143.	*Quercus leucotrichophora* A.Camus	√	√	√			+							2200-3500	India, Pakistan, Afganistan, Nepal, Myanmar, Bhutan, China	Apr- May	Dec- Feb	E
144.	*Quercus prinus* L.	√						+						up to 2000	India, China, Nepal, Vietnam, Australia, Pacific Island	Mar- Apr	Oct- Dec	E
145.	*Quercus robur* L.	√						+						up to 2000	India, Europe	Mar- Apr	Sep- Oct	E
146.	*Quercus rubra* L.	√	√	√				+						2200-3000	India, Pakistan, Indonesia, Nepal, Bhutan	April- May	Dec- Feb	E
147.	*Quercus semecarpifolia* Sm.	√	√	√			+							2100-3000	India, Pakistan, Afganistan, Bhutan, Myanmar, Bangladesh, Nepal, China	Marh- April	Oct- Dec	E
148.	*Quercus undulata* Torr.	√						+						2000-2500	India, China, Bhutan, Nepal	Mar- Apr	Sep- Oct	E
	FLACOURTIACEAE																	
149.	*Casearia elliptica* Klotzsch	√		√				+						up to 900	India, Sri Lanka, Pakistan	Apr- May	Apr- Aug	D
150.	*Flacourtia indica* (Burm. f) Merr.	√	√	√									+	Up to 1600	India, Pakistan, Sri Lanka	Feb- Mar	Apr- Jun	D
151.	*Flacourtia jangomas* (Lour.) Raeusch.	√	√	√					+					Up to 600	India, China, Asia	Jul- Aug	Nov- Dec	E
152.	*Xylosma congestum* (Lour.) Merr.	√	√	√				+						up to 1600	India, China, Taiwan, Japan	Jul- Aug	Oct	D
153.	*Xylosma longifolium* Clos.	√	√	√				+						Up to 1500	India, Pakistan, Nepal, China, Thailand	Oct- Dec	Mar- May	E
	HIPPOCASTANACEAE																	

154.	*Aesculus assamica* Griff.			√										up to 1400	India, Afganistan, Myanmar	Mar- May	Jun- Aug	D
155.	*Aesculus indica* (Wallich *ex* Cambess.) Hook.f.	√	√	√			+							1500- 2900	India, Afghanistan, Pakistan, Nepal	May- Jun	Sep- Nov	D
	JUGLANDACEAE																	
156.	*Engelhardtia spicata* Leschen. *ex* Blume	√	√	√				+						600-2100	India, Bhutan, Nepal, Cambodia, China, Indonesia, Laos, Malaysia, Philippines	Mar- May	Jun	D
157.	*Juglans regia* L.	√	√	√					+					1600-2700	India, Afghanistan, Pakistan, Nepal, China and Myanmar, America, Europe, Caucasus, Syria, Iran	Feb- Apr	Oct- Nov	D
	LAURACEAE																	
158.	*Cinnamomum camphora* (L.) Siebold	√	√	√		+								up to 800	Cosmopolitan	Mar-Apr	Apr- Jun	E
159.	*Cinnamomum glanduliferum* Meissn.			√									+	1200- 2200	India, Bhutan, China, Malaysia, Myanmar	May- Jun	Jun-Jul	E
160.	*Cinnamomum tamala (Buch.-Ham) Nees & Nees*	√	√	√		+								600-2200	India, Bhutan	May	Jun-Jul	E
161.	*Cinnamomum zeylanicum* Breyn.	√		√		+								600-2200	India, Bhutan, China, Malaysia, Myanmar	Jun	Jun-Jul	E
162.	*Dodecadenia grandiflora* Nees	√		√									+	600- 2600	India, China, Nepal, Myanmar, India	Mar- Apr	Nov	E
163.	*Grevillea robusta* A.Cunn. *ex* R.Br	√	√	√						+				800-2200	India, Australia	Mar-Apr	Oct- Dec	E
164.	*Lindera nacusua* (D.Don) Merr.			√			+						+	up to 1200	India, China, Nepal, Vietnam, Myanmar, Bhutan	Mar- April	Dec	E
165.	*Lindera pulcherrima* (Nees) Hook. f.			√			+							1800-2800	India, China, Myanmar, Bhutan, Nepal	Mar- April	Nov	E
166.	*Litsea chinensis* Lam.	√		√									+	up to 1000	India, China	Jun- Aug	Nov- Dec	E
167.	*Litsea elongata* (Nees) Hook.f.	√	√	√									+	500-2300	India, China, Bhutan, Myanmar	Aug- Sep	Nov-Dec	E
168.	*Litsea glutinosa* (Lour.) Robins.			√			+							1500-2000	India, Bhutan, China	Oct-Feb	Mar-Aug	E
169.	*Litsea monopetala* (Roxb.) Persoon	√		√									+	up to 1500	India, Malaysia, Thailand, Myanmar	Nov- Feb	Feb- May	E
170.	*Neolitsea cuipala* (D. Don) Kosterm.	√	√	√				+						600-1800	India, Pakistan, China.	Mar	Nov	E
171.	*Neolitsea pallens* (D. Don) Momiy. & H. Hara			√				+						1200-1400	India, China, Nepal	Mar- Apr	Apr-Jun	E
172.	*Neolitsea umbrosa* (Nees) Gamble	√	√	√			+							1300-2400	India, China	Mar	Oct- Nov	E
173.	*Persea bombycina* (King *ex* Hoof.f.) Kosterm.	√	√	√			+							900-1500	India, Bhutan, Myanmar, China, Bangladesh, Nepal, Cambodia, Indonesia	May	Jun-Jul	E
174.	*Persea duthiei* (King) Kosterm.	√	√	√			+							1500-2700	India, Pakistan, Myanmar	Mar- Apr	Jun- Aug	E
175.	*Persea gamblei* (King *ex* Hoof.f.) Kosterm.	√	√	√									+	500-1500	India, Pakistan, China, Taiwan, New Caledonia & Australia.	Mar- Apr	Jun- Jul	E
176.	*Persea odoratissima* (Nees) Kosterm.	√		√									+	800- 2100	India, Pakistan, Myanmar	Mar- Apr	Jun- Jul	E
177.	*Phoebe lanceolata* (Nees) Nees	√	√	√			+							300-1400	India, Myanmar, Bhutan	Feb- Jun	Sep- Nov	E
178.	*Phoebe pallida* (Nees) Nees			√			+							1500- 2100	India, Nepal, Bhutan	Jun	Oct- Dec	E

	LECYTHIDACEAE																	
179.	*Careya arborea* Roxb.	√	√	√	+									up to 800	India, Afganistan, Malaya	Mar- Apr	Jul	D
	MAGNOLIACEAE																	
180.	*Liriodendron tulipifera* L.	√								+				up to 1200	India, Nepal, America	Apr- Jun	Aug- Sep	D
	MALVACEAE																	
181.	*Kydia calycina* Roxb.	√	√	√							+			600- 1300	India, Pakistan, Myanmar and China	Jul- Oct	Nov- Mar	D
	MELIACEAE																	
182.	*Azadirachta indica* A.Juss.	√	√	√		+								up to 1000	India, China, Malaysia and Pakistan	Mar Apr	Jul	E
183.	*Dysoxylum binectariferum* (Roxb.) Hook.f. *ex* Bedd.			√		+								150-200	India, Sri Lanka	Sep	Jan	E
184.	*Melia azedarach* L.	√	√	√		+								up to 1200	India, Pakistan, China, Myanmar, Iran	Mar-May	Nov-Feb	D
185.	*Toona ciliata* Roem.	√	√	√	+									up to 1300	India, Pakistan, Bangladesh, Nepal, Bhutan, China	Mar- Apr	Jun- Jul	D
186.	*Toona microcarpa* (C.DC.) Harms.	√	√	√	+									up to 2200	India, Nepal, Thailand, China, Indonesia	Apr- Jul	Jun- Jul	D
187.	*Toona serrata* (Royle) Roem.	√	√	√	+									1200-2300	India, Myanmar and Pakistan	May- Jun	Oct	D
188.	*Trichilia connaroides* (Wight & Arn.) Bentvelzen			√									+	300-1500	India, Nepal, Myanmar, Bhutan	Apr- May	Nov- Jan	E
	MIMOSACEAE																	
189.	*Acacia catechu* (L.f.) Willd.	√	√	√									+	up to 1200	India, Pakistan, Nepal, Myanmar	May- Jul	Jan- Mar	D
190.	*Acacia dealbata* Link. f.	√	√	√						+				up to 1400	India, Australia, Europe, Madagascar	Apr- May	Jun- Jul	D
191.	*Acacia farnesiana* (Linn.) Willd.	√		√									+	1200-1800	India, America	Mar- Jun	Jul- Aug	D
192.	*Acacia lenticularis* Buch.-Ham. *ex* Wall.	√	√	√				+						up to 600	India, Nepal	Apr- May	Jun- Jul	D
193.	*Acacia modesta* Wall.	√					+							1100- 1300	India, Afganistan, Pakistan, China, Japan	Mar- May	Jun- Jul	D
194.	*Acacia pseudo-eburnea* Drumm	√	√	√				+						up to 1200	India	Jan- Feb	Apr	D
195.	*Albizia chinensis* (Osbeck) Merr.	√	√	√			+							up to 1300	India, Pakistan, Sri Lanka, Nepal, Bhutan, Myanmar, China, Asia, Philippines, Java	Mar- Apr	Apr- Sep	D
196.	*Albizia julibrissin* Durazz.	√	√	√									+	1500-2500	India, China, Japan, Russia, Persia, Austria, Yogusalavia and Bulgaria	Apr- Jun	Nov- Dec	D
197.	*Albizia lucidor* (Steudel) Nelsen	√	√	√									+	up to 1400	India, Nepal, Bhutan, Myanmar, China	Apr- Jun	Nov- Dec	D
198.	*Albizia lebbeck* (L.) Benth.	√	√	√						+				up to 1000	India, Pakistan, Australia and Tropical Africa	Apr- May	Jan- Mar	D
199.	*Albizia odoratissima* Benth.	√	√	√			+							up to 1000	India, Pakistan, Sri Lanka, Myanmar	May- Jun	Mar- Apr	D
200.	*Albizia procera* (Roxb.) Benth.		√	√									+	up to 900	India, Myanmar	Jun- Aug	Aug- Nov	D

201.	*Albizia stipulata* (DC.) Boivin			√									+	300-1400	India, Pakistan, Sri Lanka, Nepal, Bhutan, Myanmar, Southern China, South East Asia, Philippines, Java	Mar- Apr	May-Jun	D
202.	*Indopiptadenia oudhensis* (Brandis) Brenan			√									+	300-600	India, Nepal	Apr-May	May-July	D
203.	*Leucaena leucocephala* (Lam) De wit	√	√	√									+	300-600	Asia	Sep- Nov	Nov- Dec	D
	MORACEAE																	
204.	*Artocarpus lacucha* Buch.-Ham. *ex* D. Don	√		√									+	up to 1200	India, Bangladesh, Bhutan, Cambodia, Laos, Malaysia, Myanmar, Nepal, Srilanka, Thailand, Vietnaam	Apr	Jul	D
205.	*Broussonetia papyrifera* (L.) L'Her. *ex* Vent			√					+					1200-1500	India, Japan, China and Asia, Russia, Pakistan, Africa, Europe, Polynesia, Philippines, America		Mar-Aug	D
206.	*Ficus arnottiana* Miq.			√			+							500- 1400	India, Bangladesh, Bhutan, Cambodia, Laos, Malaysia, Myanmar, Nepal, Srilanka, Thailand, Vietnaam	-	Jul	E
207.	*Ficus auriculata* Lour.	√	√	√									+	500- 1400	India, Bhutan, Bangladesh, Myanmar, China		Jun- Jul	D
208.	*Ficus benghalensis* L.	√	√	√								+		up to 1200	India, Pakistan, Bangladesh	-	May-Jul	E
209.	*Ficus cunia* Buch.-Ham. *ex* Roxb.	√		√			+							up to 1200	India, Pakistan, Bhutan, Myanmar	-	Jul-Sep	E
210.	*Ficus gibbosa* Blume			√			+							up to 600	India, Japan, China, Asia, Russia, Pakistan, Africa, Europe, Polynesia, Philippines, America	-	May- Jun	E
211.	*Ficus glaberrima* Blume			√					+					300-800m	India, Bangladesh, Bhutan, Cambodia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnaam	-	Feb- Mar	E
212.	*Ficus hispida* L.	√	√	√					+					up to 1200	India, Pakistan, Bangladesh, Myanmar, Andaman Island, Sri Lanka, China, Malaysia, Australia, New Guinea	-	Jul	E
213.	*Ficus microcarpa* L.f.			√			+							up to 1200	India, Sri Lanka, China, Australia, America	-	Aug -Dec	E
214.	*Ficus nemoralis* Wall. *ex* Miq.			√									+	600-900	India, Pakistan	-		E
215.	*Ficus neriifolia* J.E.Smith	√	√	√			+							up to 2000	India, Pakistan	-	Jun- Aug	E
216.	*Ficus palmata* Forssk.	√	√	√					+					up to 1800	India, Pakistan, Afghanistan, Nepal, Iran, Arabian Peninsula, Somalia, Sudan, Ethiopia and Egypt	-	Jun- Aug	D
217.	*Ficus pomifera* Kurz			√									+	up to 1800	India, Pakistan, Afghanistan, Nepal, Iran, Arabian Peninsula, Somalia, Sudan, Ethiopia and Egypt	-	Jun- Aug	D
218.	*Ficus racemosa* L.	√	√	√					+					up to 900	India, Pakistan, Sri Lanka, Bangladesh, Myanmar, Thailand, Malaysia, Indonesia to Australia	-	Jul- Aug	D
219.	*Ficus religiosa* L.	√	√	√								+		up to 1500	India, Pakistan, Bangladesh, Sri Lanka, China, Myanmar and Thailand	-	Oct- Nov	D
220.	*Ficus retusa* L.			√			+							up to 900	India, Pakistan, Sri Lanka, China, Australia, Iraq, Africa, New Caledonia	-	Feb- Apr	E

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221.	*Ficus rigida* Blume	√	√	√			+							up to 800	India, Bhutan, China, Indonesia, Vietnam, Australia	-	May- Jul	E
222.	*Ficus rumphii* Blume	√	√	√					+					up to 1200	India, Pakistan, Bangladesh, Myanmar, Malayasia	-	May- Jul	D
223.	*Ficus semicordata* Buch.-Ham ex Sam	√	√	√			+							up to 1200	India, Pakistan, Bhutan, Myanmar	-	May- Jun/ Oct	E
224.	*Ficus virens* Dryand.	√	√	√			+							300-2000	India, Pakistan, Myanmar	-	May- Jun/ Oct	E
225.	*Morus alba* L.	√	√	√					+					600-900	India, China, Japan, Malaya, Myanmar, Pakistan		May- Jun/ Oct	D
226.	*Morus australis* Poir.	√	√	√			+							500-2400	India, Myanmar, China	Mar- Apr	Apr- May	E
227.	*Morus laevigata* Wall *ex* Brandis	√		√									+	300- 600	India, Pakistan, Nepal, China	Feb- Mar	Mar- Jun	D
228.	*Morus serrata* Roxb.	√	√	√			+							1000- 2800	India, Pakistan	Apr May	May- Jun	D
229.	*Streblus asper* Lour.	√	√	√									+	up to 500	India, Bhutan, Nepal, Cambodia, China, Indonesia, Laos, Malaysia, Philippines	Mar- Apr	May-Jun	E
	MYRICACEAE																	
230.	*Myrica esculenta* Buch.-Ham *ex* D.Don	√	√	√									+	1200-2800	India, Nepal, Bhutan, China, Indonesia, Laos, Malaysia, Nepal, Philippines	Aug- Oct	May- Jun	E
231.	*Myrica nagi* Thunb.			√					+					1500-2100	India, Myanmar, China	Aug- Oct	May- Jun	E
	MYRTACEAE																	
232.	*Callistemon viminalis* (Sol. *ex* Gaertn.) G. Don	√											+	up to 2500	India, Pakistan, Sri Lanka	Apr-Jun	Apr-May	D
233.	*Cleistocalyx operculatus* (Roxb.) Merr. & Perry			√									+	up to 2500	India, Nepal to Australia	Apr-Jun	Apr-May	E
234.	*Eugenia formosum* Wall.			√				+						900-1200	India, Myanmar, Thailand	Nov- Dec	Apr-May	E
235.	*Eugenia operculata* Roxb.			√				+						up to 1200	Cosmopolitan	Apr- May	Aug- Sep	E
236.	*Syzygium cumini* (L.) Skeels	√	√	√					+					up to 1200	India, Bhutan, Indonesia, Laos, Malaysia, Thailand, Vietnam	Mar- May	Jun-Jul	D
237.	*Syzygium venosum* DC.	√	√	√									+	up to 1200	India, Bhutan, Indonesia, Laos, Malaysia, Thailand, Vietnam	Mar- May	Jun-Jul	D
	OLEACEAE																	
238.	*Chionanthus roxburghii* (Spreng.) Srivastva & S.L. Kapoor			√	+									up to 2000	India, China, Nepal, Vietnam, Australia, Pacific Island	Mar- Apr	Sep	D

239.	*Fraxinus excelsior* Linn.	√											+	1600-2500	India, China, Japan, Malaysia	Mar- Apr	October	D
240.	*Fraxinus floribunda* Wall.	√											+	1200-2700	India, China, Nepal, Vietnam, Pacific Island	Mar- May	Jun- Sep.	D
241.	*Fraxinus micrantha* Linglesh.	√	√	√									+	1700-2500	India, China, Nepal, Vietnam, Laos	Jul- Sep	Oct- Dec	D
242.	*Fraxinus xanthoxyloides* (G. Don) A. DC.	√	√	√									+	2500-3300	India, Afghanistan, Pakistan	May	Jun- Jul	D
243.	*Ligustrum compactum* (Wallich *ex* DC.) Hook.f. & Thomson *ex* brandis	√	√	√			+							1500-2500	Asia	May- Jun	Oct- Jan	D
244.	*Ligustrum indicum* (Lour.) Merr.	√	√	√			+							800-2900	Asia	Mar- Apr	Oct- Dec	E
245.	*Linociera intermedia* Wight	√		√						+				up to 600	Asia	May-Jun	Jun- Aug	E
246.	*Nyctanthes arbor-tristis* L.			√						+				up to 1300	India, Pakistan	Aug- Oct	Feb- Mar	D
247.	*Olea cuspidata* Wall. *ex* G. Don	√		√									+	1000-2500	India, Afganistan, Nepal	May- Jun	Oct- Sep	E
248.	*Olea glandulifera* Desf.	√	√	√									+	600-1800	India, Nepal, Pakistan	Apr- May	Feb	E
249.	*Osmanthus fragrans* (Thunb.) Lour.			√					+					1100-2000	India, Pakistan, China, Japan	Oct	Apr	E
250.	*Schrebera swietenioides* Roxb.			√										up to 800	India, Pakistan	May- Jun	Mar	D
	PITTOSPORACEAE																	
251.	*Pittosporum eriocarpum* Royle	√	√	√		+								900-2000	India	Mar- Apr	Sep- Nov	E
252.	*Pittosporum napaliense* Sherff	√	√	√									+	Up to 1400	India, Pakistan, Nepal, Bhutan, China and Madagascar	Jun- Jul	Dec- Feb	E
	RHAMNACEAE																	
253.	*Hovenia dulcis* Thunb.	√	√	√										900-2800	India, China, Japan	May- Jun	Oct- Dec	D
254.	*Rhamnus purpurea* Edgew.	√	√	√			+							1300-3000	India, Pakistan, Nepal	May- Jun	Jun- Sep	D
255.	*Rhamnus virgata* Roxb.	√	√	√		+								600-2500	India, Afghanistan, Pakistan, Bhutan, Myanmar	Mar- May	Jun- Oct	D
256.	*Sageretia oppositifolia* Brongs.	√	√	√									+	up to 2100	India, Nepal and Java	Sep- Oct	Apr- Jun	D
257.	*Ziziphus hysudrica* (Edgew.) Hole	√							+					up to 800	India, Pakistan, Afganistan, Iran, China, Mongolia, Japan, Europe	Sep- Dec	Jan- Mar	D
258.	*Ziziphus mauritiana* Lam.	√	√	√					+					up to 800	India, Pakistan, Afghanistan, Sri Lanka, China, Australia, Africa.	Jun- Sep	Nov- Feb	D
259.	*Ziziphus rugosa* Lam.	√	√	√					+					up to 800	India, Pakistan, Sri Lanka, Myanmar	Mar- Ap	Jun- Jul	E
	RHIZOPHORACEAE																	
260.	*Carallia integerrima* DC.			√									+	up to 600	India, Madagascar, Sri Lanka, China, Malaysia, Australia	Feb- Mar	May	E
	ROSACEAE																	
261.	*Prunus cerasoides* Buch.-Ham. *ex* D. Don	√	√	√			+							600-2600	India, Nepal, Bhutan, China, Myanmar, Thailand	Oct- Dec	Apr-May	D
262.	*Prunus cerasus* L.	√	√	√			+							1500-2400	India, Europe	Apr-May	Jul- Aug	D

263.	*Prunus cornuta* (Wall. *ex* Royle) Steud.	√	√	√			+							1900-3000	India, Nepal, Bhutan	Apr-May	Jul- Oct	D
264.	*Prunus nepalensis* Ser.	√	√	√					+					1600-2000	India, West China, Myanmar, Nepal	Apr-May	July	D
265.	*Prunus undulata* Buch.- Ham *ex* D.Don	√	√	√			+							600-3000	India, Nepal, Bhutan, Bangladesh, Myanmar, North Thailand, laos, Vietnam, Sumatra	Apr-May	July	D
266.	*Pygeum acuminatum* Colebr.			√			+							1900-2200	India, Nepal, Srilanka, Bangladesh, Myanmar, Thailand, Laos, Vietnam	Apr-May	Jul	E
267.	*Pyrus pashia* Buch.- Ham *ex* D.Don	√	√	√					+					700-2500	India, Nepal, Myanmar, China, Thailand, Laos, Vietnam, Pakistan, Afganistan	Feb- Apr	Dec- Feb	D
268.	*Sorbus cuspidata* (Spach) Hedlund			√									+	2000-3500	India, Bhutan, Myanmar, Nepal	Jun- July	Aug-Sep	E
269.	*Stranvaesia glaucescens* Lindl.			√									+	700- 2200	India, North Iran, Europe, Turkey, America, Afganistan	May-Jun	Oct- Jan	E
	RUBIACEAE																	
270.	*Anthocephalus cadamba* (Roxb.) Miq.			√									+	300-800	India, Nepal	May	Jun- Jul	E
271.	*Catunaregam spinosa* (Thunb.) Tirven	√	√	√									+	300-800	India, Sri Lanka, Pakistan South Africa.	Jun	Jun- Jul	D
272.	*Catunaregam uliginosa* (Retz.) Sivarajan	√	√	√			+							up to 600	India, Nepal, Bangladesh, Bhutan, Myanmar, China, Cambodia, Indonesia	May- Jun	Mar- Apr	D
273.	*Ceriscoides turgida* (Roxb.) Tirveng.	√	√	√		+								up to 600	India, Pakistan, Bangladesh, China, Malaya	Apr- May	Mar- Apr	D
274.	*Haldina cordifolia* (Roxb.) Ridsdale	√	√	√	+									up to 900	India, Nepal, Bangladesh, Bhutan, Myanmar, China, Cambodia, Indonesia	Jun- Jul	April-May	D
275.	*Hymenodictyon excelsum* (Roxb.) DC.	√		√			+							600-1400	India, Myanmar, China, Malaya, Pakistan	Jun- Aug	Jan- Mar	D
276.	*Hymenodictyon flaccidum* Wall.	√	√	√			+							600-1300	India, Pakistan, Myanmar, China, Malaya	May-Jun	Feb- Mar	D
277.	*Hymenodictyon orixense* (Roxb.) Mabb.	√	√	√			+							up to 900	India, Pakistan, Myanmar, China, Malaya, Pakistan	May-Jun	Feb- Mar	D
278.	*Mitragyna parvifolia* (Roxb.) Korth.	√	√	√									+	up to 900	India, Angola, Benin, Cameroon, Congo, Guinea, Gabon, Ghana, Liberia, Nigeria	Jun- Jul	May	D
279.	*Wendlandia exserta* (Roxb.) DC.	√		√		+								up to 1700	India, Pakistan, Nepal	Mar- May	Apr-May	E
280.	*Wendlandia heynei* (Roem & Schult) Santapau & Merchant	√	√	√									+	700-1500	India, Myanmar, Thailand	Feb- Mar	Apr- Jul	E
281.	*Wendlandia puberula* DC.	√		√		+								700-1500	India, Pakistan	May-Jun	Jun-Jul	E
	RUTACEAE																	
282.	*Acronychia pedunculata* (L.) Miq.			√									+	up to 1500	India, Bhutan, Myanmar, Sri Lanka, Thailand, Cambodia, Laos, Vietnam, Vietnam, China, Sumatra, Malay peninsula, Borneo, Philippines	May	Jun- Dec	E
283.	*Aegle marmelos* (L.) Corr.	√	√	√		+			+					up to 1200	India, Burma, Baluchistan	May- Jun	May- Jun	D
284.	*Citrus jambhiri* Lushington	√	√	√					+					up to 1200	India, Nepal, China, Myanmar, Pakistan	Mar-Apr	May- Jan	E

285.	*Citrus latipes* Hook. f. & Thomson *ex* Hook. f.	√	√	√					+					up to 1200	India, Nepal, Myanmar, Bhutan,	Mar-Apr	May- Jan	E
286.	*Limonia crenulata* Roxb.	√	√	√									+	up to 1800	India, Sri Lanka, Pakistan, Myanmar, Bhutan, Bangladesh, China, Indochina, Thailand, Java	Apr- May	Nov- Dec	D
287.	*Murraya exotica* L.	√	√	√						+				500-1300	India, Myanmar, Vietnam, Cambodia, Laos, Sri Lanka, China	Mar- Apr	May- Jul	E
288.	*Murraya koenigii* (L.) Spreng.	√	√	√		+			+					up to 1200	India, Pakistan, China, Sri Lanka.	Mar- May	Jun- Jul	D
289.	*Zanthoxylum alatum* Roxb.	√	√	√		+								900-2000	India, Pakistan, Bhutan, Japan, Korea, China	Apr- Jun	Aug- Oct	D
	SABIACEAE																	
290.	*Meliosma dilleniifolia* (Wallich *ex* Wight & Arn.) Walp.	√	√	√					+					2000-3000	India, Myanmar, Nepal	May- Jun	Sep	D
291.	*Meliosma simplicifolia* (Roxb.) Walp.			√				+						1500-2100	India, Pakistan, Nepal, Myanmar, China, Malaya	Apr- Jun	Oct- Nov	E
292.	*Meliosma simplicifolia* Subsp. Thomsonii (King *ex* Brandis) Beusekom	√		√				+						1200-2000	India, Nepal, Bhutan, Bangladesh, Myanmar, SriLanka, Vietnam, Thailand, Sumatra, Java, China	Nov- Jan	Feb- Jun	E
293.	*Meliosma wallichii* Planch. *ex* Hook. f.	√		√				+						1900-2500	India, Nepal, Bhutan, Bangladesh, Myanmar, SriLanka, Vietnam, Thailand, Sumatra, Java, China	Jun-Jul	Jul- Sep	E
	SALICACEAE																	
294.	*Populus ciliata* Wallich *ex* Royle	√	√	√			+							1500-2000	India, Pakistan, Nepal, Bhutan, Myanmar	Mar- Apr	Jun	D
295.	*Salix acmophylla* Boiss.	√	√	√			+							500-1600	India, Pakistan, Afghanistan, Turkey, Syria, Palestine, Sinai, Iraq, Iran,	Feb- Mar	Mar- Apr	D
296.	*Salix alba* L.	√	√	√										1200-2000	Throughout Asia and Europe	Mar- Apr	May- Sep	D
297.	*Salix daphnoides* Villars	√		√									+	1800- 3000	India, Afghanistan, Pakistan, Palestine, Sinai, Iraq, Iran	Mar-May	Jun- Jul	D
298.	*Salix denticulata* Andersson	√					+							1200-2300	India, China, Nepal, Vietnam, Australia, Pacific Island	March-May	Jun- Jul	D
299.	*Salix fragilis* L.	√					+							1200-2300	India, Afganistan	Mar-May	Jun- Jul	D
300.	*Salix oxycarpa* Anders.	√	√	√			+							2000-3000	India, Afganistan	Apr- May	Jun	D
301.	*Salix seriocarpa* Anderss.	√											+	up to 2500	India, Afganistan, Pakistan, China, Japan	Sep- Oct	Nov- Dec	D
302.	*Salix tetrasperma* Roxb.	√	√	√									+	up to 2600	India, Pakistan, China, Indonesia, Myanmar, Thailand	Sep- Oct	Nov- Dec	D
	SAPINDACEAE																	
303.	*Dodonaea viscosa* L.	√	√	√						+				up to 800	India, Pakistan, Sri Lanka, China, Australia, S. Africa, N. America,	Jan- Sep	Jun- Jul	E
304.	*Koelreuteria paniculata* Laxm			√									+	500- 1000	India, China, Formosa, Fiji	Jan- Sep	Jun- Jul	E
305.	*Sapindus mukorossi* Gaertn.	√	√	√				+					+	up to 1500	India, Pakistan, China, Japan	May- Jun	Oct- Feb	D
306.	*Schleichera oleosa* (Lour.) Oken.	√	√	√	+									up to 1000	India, Myanmar, Thailand, Vietnam, Sri Lanka	Feb- Nov	Oct- Nov	D

307.	*Madhuca longifolia* (J. Koenig ex L.) J.F. Macbr.	√	√	√									+	up to 900	India, Nepal, Bhutan	Mar- Apr	Jun-Jul	D
308.	*Mimopus elengi* L.	√								+				up to 1200	India, Nepal, Bhutan, Myanmar, China, Bangladesh, Cambodia, Indonesia	Jan- Feb	Jun-Jul	D
	SAXIFRAGACEAE																	
309.	*Itea nutans* Royle			√									+	600-1800	India	May-Jun	Jun- Jul	D
	SIMARUBACEAE																	
310.	*Picrasma quassioides* (D. Don) Benn.	√	√	√		+								900-2500	India, China	May-Jun	July- Sep	D
	STERCULIACEAE																	
311.	*Sterculia colorata* Roxb.			√										up to 1300	India, Sri Lanka, Myanmar, Bangladesh	Mar- Apr	Apr- May	D
312.	*Sterculia pallens* Wall. *ex* King			√				+						up to 1300	India, Pakistan	Feb- Apr	Apr- Jun	D
313.	*Sterculia urens* Roxb.	√	√	√				+						up to 1400	India, China, Japan	Feby- Apr	Apr- Jun	D
314.	*Sterculia villosa* Roxb.	√	√	√				+			+			up to 1400	India, Bangladesh	Feb- Apr	May	D
	STYPHYLEACEAE																	
315.	*Turnipa nepalensis* Wall.	√	√	√									+	1000-2000	India, Nepal, Myanmar, Vietnam, China	Apr- May	Oct- Nov	D
	SYMPLOCACEAE																	
316.	*Symplocos ferruginea* Roxb.	√		√		+								1200-1600	India, Pakistan, Bhutan, Myanmar, China, Korea and Japan	Sep-Nov	October-Dec	D
317.	*Symplocos paniculata* Miq.	√	√	√		+								1000-2900	India, Bhutan, Myanmar, China, Bangladesh, Nepal, Sri Lanka, Indonesia	Apr- Jun	Oct- Dec	D
318.	*Symplocos racemosa* Roxb.			√		+								up to 1400	India, Bhutan, China, Cambodia, Indonesia, Japan, Laos, Malaysia, Myanmar, Thailand, Vietnam	Dec- Jan	May- June	E
319.	*Symplocos ramosissima* Wall. *ex* G. Don	√		√			+							1200-2600	India, Myanmar, Thailand, China	Jun- Jul	Nov- Mar	E
320.	*Symplocos spicata* Wallich *ex* G.Don			√									+	500-1500	India, China, Japan, Malaysia	October	Oct- Nov	E
321.	*Symplocos theaefolia* D.Don			√			+							500-2500	India, Bhutan, China, Cambodia, Indonesia, Japan, Laos, Malaysia, Myanmar, Thailand, Vietnam	Mar- Apr	Sep- Oct	E
	TAMARICACEAE																	
322.	*Tamarix dioica* Roxb. *ex* Roth		√	√									+	up to 1000	India, Bangladesh, Sri Lanka, Pakistan and Afghanistan	Almost the year	Almost the year	E
	TERNSTRCEMIACCEAE																	
323.	*Cleyera ochnacea* DC.			√									+	1200-1800	India, China	Jun- Jul	Oct-Nov	E
	THEACEAE																	
324.	*Eurya acuminata* DC.			√				+						1200-2600	India, Sri Lanka, Bhutan, Myanmar, China, Malaysia	Sep- Dec	July- Sep	E

	TILIACEAE																
325.	*Grewia asiatica* L.	√	√	√			+				+			up to 900	India, Pakistan	Apr- May	Jun- Aug	D
326.	*Grewia damine* Gaertn.		√	√			+				+			500-1500	India, Pakistan, Nepal and Africa.	Jul- Sep	Aug- Nov	D
327.	*Grewia elastica* Royle			√			+				+			up to 1500	India, Pakistan, Myanmar	May- June	Jun-Aug	D
328.	*Grewia helicterifolia* Wallich *ex* G.Don			√			+				+			500-1500	India, Bangladesh and Sri Lanka	May- June	Jun-Aug	D
329.	*Grewia laevigata* Vahl.	√		√			+				+			up to 1200	India, Myanmar, Malaya Islands, China	Apr- Dec	Jun- March	D
330.	*Grewia oppositifolia* Roxb. *ex* DC.	√		√			+				+			300-1200	India, Pakistan, Nepal	Apr- Jun	Oct-Dec	D
331.	*Grewia optiva* J.R. Drumm *ex* Burrett	√	√	√			+				+			500-2500	India, Pakistan, Nepal, Bhutan	Jun- Sep	Dec- Mar	D
332.	*Grewia sclerophylla* Roxb. *ex* G.Don	√	√	√			+				+			up to 1000	India, Bangladesh, Myanmar	Aug- Sep	Nov- Jan	D
333.	*Grewia tiliifolia* Vahl			√			+				+			up to 1400	India, Sri Lanka, Asia	Jan- Sep	May- Oct	D
334.	*Tilia cordata* Mill.	√		√									+	2000-2500	India, Europe, Russia, Greece	Jun- Jul	Jun- Oct	D
335.	*Tilia platyphyllos* Scop.	√											+	2000-2500	India, Europe	Jun- Oct	Jun- Oct	D
336.	*Tilia vulgaris* Hayne	√											+	2000-2500	India, Europe	May- Oct	June- Oct	D
	ULMACEAE																	
337.	*Celtis eriocarpa* Decne.	√	√	√			+							900-1800	India, Baluchistan	Mar Apr	Sep- Nov	D
338.	*Celtis tetrandra* Roxb.	√	√	√			+							up to 1900	India, Afganistan, Pakistan, China, Nepal, Myanmar, Bangladesh	Feb- Mar	Sep- Oct	D
339.	*Holoptelea integrifolia* (Roxb.) Planch.	√	√	√	+									up to 800	India, Afganistan, Pakistan, China, Nepal, Myanmar, Bangladesh	Feb- Mar	Apr- May	D
340.	*Trema cannabina* Lour.	√									+			up to 1200	India, China, Japan, Malaysia, Indonesia, Myanmar, Nepal	Feb- Mar	Sep- Oct	E
341.	*Trema orientalis* (L.) Blume	√	√	√				+						600-1300	India, China, Japan, Malaysia, Indonesia, Myanmar, Nepal	May-Jun	Jun- Nov	E
342.	*Trema politoria* (Planch.) Blume	√	√	√				+						300- 1500	India, Bhutan, China	Apr- Jun	Dec- Jan	E
343.	*Ulmus brandisiana* Schn.	√		√			+							1300-2100	India, Pakistan	Feb	Mar-Apr	D
344.	*Ulmus chumlia* Melville & Heybroek	√	√	√			+							1200-2500	India, Tailand, Myanmar, Bhutan, China	Feb-Mar	Jun- Jul	D
345.	*Ulmus villosa* Brandis *ex* Gamble	√	√				+							1200-2500	India, Pakistan, Myanmar, Afganistan, Nepal	Feb-Mar	Jun- Jul	D
346.	*Ulmus wallichiana* Planch.	√	√	√									+	2200-3000	India, Pakistan, Nepal	Mar- Apr	Jun	D
	URTICACEAE																	
347.	*Boehmeria macrophylla* Hornem			√							+			500-1500	India, China, Nepal,	Aug- Sep	Sep- Oct	E
348.	*Boehmeria rugulosa* Wedd.	√	√	√							+			500-1500	India, Bhutan, Nepal	Jul- Sep	Nov	E
349.	*Debregeasia longifolia* (Burmf.) Wedd.	√	√	√			+							600- 1500	India, Srilanka, Myanmar, Thailand, China	Sep- Oct	Nov- Feb	E
350.	*Oreocnide frutescens* (Thunb.) Miq.	√											+	up to 1300	India, Myanmar, China	Apr- Jun	Jun- Oct	D

	VERBENACEAE																	
351.	*Callicarpa arborea* Roxb.			√				+						up to 1200	India, Nepal, Myanmar, Bangladesh, Cambodia, Indonesia, Malayan Island, Malaysia, New Guinea, Philippines, Thailand, Srilanka, Vietnam	Apr- Jun	Aug	D
352.	*Gmelina arborea* Roxb. ex Sm.	√	√	√	+	+								up to 900	India, Asia, Nepal, Bangladesh, Sri Lanka, Pakistan, Africa	Mar- Apr	May- Jun	D
353.	*Premna latifolia* Roxb.			√				+						up to 900	India, Bangladesh, Cambodia, Myanmar, China, Laos, Malaysia, Sri Lanka, Thailand	Apr- Jun	Jul	D
354.	*Tectona grandis* L.f.	√	√	√	+									up to 500	India, Malaysia, Asia	Apr- Jun	Aug	D

Abbreviations: T- Timber, M- Medicinal, F-Fodder, Fu- Fuel, Ed- Edible, A/O- Avenue/ Ornamental, R/F- Resin,/ Fibre, D-Deciduous, E- Evergreen, S- Sacred, M- Miscellaneous, HP- Himachal Pradesh, J&K- Jammu and Kashmir, UK- Uttarakhand

Major sources of Information: Hooker, H.D. (1906). *A sketch of the Flora of British India*, L. Reeve & Co., London; Brandis, D.(1906). *Indian Trees: An account of trees, Shrubs, Woody climbers, Bamboos and Plams: Indigenous or commonly cultivated in British Indian Empire*, Archibald Constable & Co. Ltd.; Singh, N.P., Singh, D. K. and Uniyal, B.P. (2002). *Flora of Jammu and Kashmir,* Vol.1, Botanical Survey of India, Howrah; Osmaston, A.E.(1927). *A Forest Flora of Kumaun,* International Book Distributors, Dehradun; Chowdhery, H.J. and Wadhwa, B.M. (1984). *Flora of Himachal Pradesh- Analysis.* Vol.1-3, Botanical Survey of India, Howrah; Gaur, R.D. (1999). *Flora of district Garhwal- North west Himalya (with ethnobotanical notes)*, Trans media, Srinagar (Garhwal).

Table 10: Cultivated trees of Western Himalaya: Angiosperms

S.No.	Species	Distributional Range			Uses									Altitudinal Range in metre (m)	Distribution	Flowering	Fruiting	Tree Habit
		HP	J&K	UK	T	M	F	Fu	Ed	A/o	R/F	S	M					
	ANACARDIACEAE																	
1.	*Mangifera indica* L.	√	√	√					+					up to 1000	India, Nepal, Bangladesh, Malaysia	Mar- Apr	Jun- Jul	E
	APOCYNACEAE																	
2.	*Alstonia scholaris* (L.) R.Br.	√	√	√									+	up to 600	India, Pakistan, Indonesia, Australia and Africa	Dec- Mar	May- Jun	E
3.	*Plumeria rubra* L.	√	√	√									+	up to 1400	India, America	Mar-Jul	Nov- Jan	D
	AVERRHOACEAE																	
4.	*Averrhoa carambola* L.			√					+					600-900	India, China, Myanmar, Malaysia and Madagascar	Mar- Apr	Jun- Jul	E
	BIGNONIACEAE																	
5.	*Jacaranda ovalifolia* R.Br.	√	√	√						+				up to 2500	India, Brazil, Argentina, America	Mar- Jun	Jul- Aug	D
6.	*Kigelia africana* (Lam.) Benth.	√	√	√		+								up to 800	India, Mozambique	May-Jul	Sep- Oct	D
7.	*Millingtonia hortensis* L.f.	√	√	√						+				up to 2500	India, Australia	Mar- Oct	Oct- Nov	E
	CAESALPINIACEAE																	
8.	*Parkinsonia aculeata* L.	√	√	√						+				up to 1300	India, America	Feb	Apr	E
9.	*Tamarindus indica* L.	√	√	√					+					up to 600	India, Africa, Pakistan	May- Jun	Mar- Apr	E
	CARICACEAE																	
10.	*Carica papaya* L.	√	√	√					+					up to 2200	India, Pakistan, America	Apr- Jun	Jul- Sep	D
	CASUARINACEAE																	
11.	*Casuarina litoralis* L.	√	√	√									+	up to 2200	India, Africa, Pakistan	Apr- Jun	Jul- Sep	D
	ELAEOCARPACEAE																	
12.	*Elaeocarpus ganitrus* Roxb. *ex* G.Don			√								+		up to 900	India, Nepal	Apr- Jun	Jul- Sep	E
13.	*Elaeocarpus sphaericus* (Gaertn.) K. Schum			√								+		up to 900	India, Nepal	Apr- Jun	Jul- Sep	E
14.	*Elaeocarpus varunua* Buch.- Ham.*ex* Masters			√								+		up to 900	India, Nepal, Sri Lanka, Myanmar	Mar- May	Jul- Sep	E
	FABACEAE																	
15.	*Delonix regia* (Bojer *ex* Hook.) Raf.	√	√	√						+				up to 900	India, Nepal, Sri Lanka, Myanmar	Mar- Apr	Jun- Jul	D
16.	*Pongamia pinnata* (L.) Pierre	√	√	√						+				up to 900	India, Austrailia, Africa and America	Mar- May	Jul- Sep	E

17.	*Robinia pseudoacacia* L.	√	√	√									+	1200-2400	India, America	Mar- May	May- Jun	D
18.	*Saraca asoca* (Roxb.) DeWilde	√	√	√						+				up to 900	India, Nepal, China, Malaysia	Mar- May	May- Jun	E
19.	*Persea bombycina* (King *ex* Hoof.f.) Kosterm	√	√	√			+							900-1500	India, Bhutan, Myanmar, China, Bangladesh, Nepal, Cambodia, Indonesia	May	Jun-Jul	E
	LYTHRACEAE																	
20.	*Lagerstroemia indica* L.	√	√	√						+				200-800	India, Bangladesh, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Pakistan and Sri Lanka	Mar- Apr	Jun- Jul	E
21.	*Lagerstroemia parviflora* Roxb.	√	√	√						+				up to 900	India, Myanmar	Apr- Jun	Dec- Jan	E
	MAGNOLIACEAE																	
22.	*Magnolia champaca* (L.) Baill. *ex* Pierre	√	√	√						+				up to 1500	India, Nepal, Java, Malaya, Myanmar, Bangladesh	Apr- Jun	Aug- Sep	E
23.	*Magnolia grandiflora* L.	√	√	√						+				up to 1000	India, America	Apr- Jun	Aug- Sep	E
24.	*Magnolia hodgsonii* (Hook.f. & Thomson) H. Keng	√								+				up to 1200	India, Nepal, Bhutan, Bangladesh, Myanmar	May - Jul	Aug- Sep	E
25.	*Magnolia hypoleuca* Sieb. & Zucc.	√								+				up to 1000	India, Nepal, Myanmar	Apr- Jun	Jul- Sep	E
26.	*Michelia champaca* L.	√	√	√								+		up to 1500	India, Nepal, Java, Malaya, Myanmar, Bangladesh	Jun-Jul	Oct-Nov	E
27.	*Michelia doltsopa* Buch.-Ham. *ex* DC.		√	√						+				1000- 2500	India, Java	Mar- Jun	Oct -Nov	D
28.	*Michelia kisopa* Buch.-Ham.*ex* DC.		√	√									+	1500-2100	India, Nepal	Sep- Nov	Oct -Nov	D
	MORACEAE																	
29.	*Artocarpus heterophyllus* Lam.	√	√	√					+					up to 1000	India, Asia and Brazil.	Apr	Jun- Sep	D
30.	*Ficus benjamina* L.		√	√					+					500- 1400	India, Bangladesh, Bhutan, Cambodia, laos, Malaysia, Myanmar, Nepal, Srilanka, Thailand, Vietnaam	-	Jul	E
31.	*Ficus drupacea* Thunb.	√	√	√								+		up to 1200	India, Pakistan, Bangladesh	-	May-Jul	E
	MORINGACEAE																	
32.	*Moringa oleifera* Lam	√	√	√									+	up to 900	India, Pakistan, Bangladesh, Myanmar, Vietnam, Philippines	Feb- Apr	May- Jun	D
	MYRTACEAE																	
33.	*Eucalyptus bicolor* A.Cunn.	√											+	up to 1300	Cosmopolitan	Throughout year		E
34.	*Eucalyptus camaldulensis* Denham	√	√	√									+	up to1500	Cosmopolitan	Throughout year		E
35.	*Eucalyptus citriodora* Hook.			√									+	up to1200	Cosmopolitan	Throughout year		E
36.	*Eucalyptus coriacea* A.Cunn.	√											+	up to 1600	Cosmopolitan	Throughout year		E
37.	*Eucalyptus crebra* F.V.Muell.	√											+	up to 1300	Cosmopolitan	Throughout year		E
38.	*Eucalyptus drepanophylla* F.V. Muell. *ex* Benth.	√	√	√									+	up to 2000	Cosmopolitan	Throughout year		E

39.	*Eucalyptus globosus* Labill.	√	√	√									+	up to 1600	Cosmopolitan	Throughout year		E
40.	*Eucalyptus obliqua* L'Hér.	√	√	√									+	up to 1400	Cosmopolitan	Throughout year		E
41.	*Eucalyptus rostrata* Schl.			√									+	up to 1200	Cosmopolitan	Throughout year		E
42.	*Eucalyptus saligna* Sm.	√	√	√									+	up to 1200	Cosmopolitan	Throughout year		E
43.	*Eucalyptus staigeriana* F. Muell. *ex* F.M. Bailey			√									+	up to 1300	Cosmopolitan	Throughout year		E
44.	*Eucalyptus tereticornis* Sm.			√										up to 1500	Cosmopolitan	Throughout year		E
45.	*Psidium guajava* L.	√	√	√					+					up to 1600	Cosmopolitan	Throughout year		E
	PLATANACEAE																	
46.	*Platanus orientalis* L.	√	√	√						+				2500-3000	India, Pakistan, China, Japan	Mar- Apr	Sep- Nov	D
	PUNICACEAE																	
47.	*Punica granatum* L.	√	√	√					+					up to 1600	India, Europe, Africa	Apr- Jun	Jul- Sep	D
	ROSACEAE																	
48.	*Malus baccata* (L.) Borkh.	√	√	√					+					1500-3400	India, Turkey	Apr- May	Jul- Sep	D
49.	*Malus pumila* Mill.	√	√	√			+							1500-3000	India, Pakistan, Europe, temperate Asia, North America, Turkey, Russia, Iran.	Apr- May	Jul- Sep	D
50.	*Prunus acuminata* Michx.			√					+					2000-2500	India, Nepal, Bhutan, Bangladesh, Myanmar, Thailand, Laos, Vietnam, Sumatra	Apr-May	Sep- Oct	D
51.	*Prunus armeniaca* L.	√	√	√					+					1600-3000	India, Asia	Mar- May	Jun	D
52.	*Prunus avium* (L.) L.	√	√	√										1500-2400	India, Turkey, Europe	Mar- May	Jul	D
53.	*Prunus cerasifera* Ehrh.	√		√				+						800-2000	India, Soviet Union, Eupore, America	May-Jun	Jul- Aug	D
54.	*Prunus persica* (L.) Batsch	√	√	√					+					2400- 3200	India, China	Jan-May	May- Oct	D
55.	*Pyrus communis* L.	√	√	√					+					600-3000	India, Iran, Europe, Turkey, Russia, Afganistan	Apr-May	Aug	D
56.	*Pyrus foliolosa* Wall.	√	√	√			+							2400-3000	India, China, Myanmar, Nepal, Bhutan	Apr-May	Oct- Nov	D
57.	*Pyrus lanata* D.Don	√	√	√					+					2400-3000	India, China, Myanmar, Nepal	Apr-May	Oct- Nov	D
	RUTACEAE																	
58.	*Citrus aurantifolia* (Christmann&Panz) Swingle	√	√	√					+					up to 2000	India, Malaysia	Jan- Feb	Apr- Sep	E
59.	*Citrus aurantium* L.	√	√	√					+					up to 2500	India, China	Mar-Apr	Oct- Nov	E
60.	*Citrus grandis* (L.) Osbeck	√	√	√					+					up to 1200	India, Malaysia	Mar-Apr	May- Jan	E
61.	*Citrus limon* (L.) Osbeck	√	√	√		+			+					up to 1400	India, Malaysia, Polynesia	Dec- Apr	Dec- Apr	E
62.	*Citrus maxima* (Burm) Merr.	√	√	√					+					up to 1400	India, Malaysia, Polynesia	Dec- Apr	Dec- Apr	E
63.	*Citrus pseudolimon* Wester	√	√	√					+					up to 2500	India, China, Myanmar, Malaysia and Madagascar	Mar-Apr	May- Jan	E
	SALICACEAE																	

64.	*Populus ciliata Wall.* Royle	√	√	√			+							1500-2000	India, Pakistan, Nepal, Bhutan, Myanmar	Mar- Apr	Jun	D
65.	*Populus nigra* L.	√	√	√									+	1200-2000	India, China, Pakistan, Europe, Africa	Apr-May	May-Jun	D
66.	*Populus pamirica* Kom.	√											+	1200-2000	India, China, Asia, Europe, Africa	Apr-May	May-Jun	D
67.	*Salix babylonica* L.	√	√	√			+							1800-3200	India, China	Mar- Jun	May-Jul	D
	SANTALACEAE																	
68.	*Santalum album* L.	√	√	√								+		900-2500	India, Nepal, Bhutan	Mar- Jun	May-Jul	E
	SAPINDACEAE																	
69.	*Litchi chinensis* Sonnerat	√	√	√					+					up to 900	India, China	Apr- Jun	Jul- Aug	E
	SAPOTACEAE																	
70.	*Diploknema butyracea* (Roxb.) Lam	√		√					+					up to 1200	India, Nepal, Bhutan	Jan- Feb	Jun-Jul	D
71.	*Manikaran hexandra* (Roxb.) Dubard	√	√	√					+					up to 1200	India, Sri Lanka	Oct- Dec	Jan- Feb	E
	SIMARUBACEAE																	
72.	*Ailanthus altissima* (Mill.) Swingle	√	√	√									+	600-1000	India, China	May- Jun	Jul- Sep	D
73.	*Ailanthus excelsa* Roxb.	√	√	√									+	600-1000	India, Sri Lanka, Pakistan	Dec- Jul	Jul- Sep	D
	STERCULIACEAE																	
74.	*Pterospermum acerifolium* Willd.	√	√	√						+				up to 900	Continental Asia	Mar- Nov	Jul- Dec	D
75.	*Pterospermum lanceifolium* Roxb.	√	√	√						+				up to 900	India, Nepal, Bangladesh, Myanmar	May- Jun	Oct- Apr	D
	ULMACEAE																	
76.	*Celtis australis* L.	√	√	√			+							1600-2700	India, Caucasus, Iraq, Iran, Afghanistan, Asia, Pakistan, Nepal	Apr- May	Sep- Oct	D

Abbreviations: T- Timber, M- Medicinal, F-Fodder, Fu- Fuel, Ed- Edible, A/O- Avenue/ Ornamental, R/F- Resin,/ Fibre, S- Sacred, M- Miscellaneous, HP- Himachal Pradesh, J&K- Jammu and Kashmir, UK- Uttarakhand

Table 11: Wild trees of Western Himalaya: Gymnosperms

S.No.	Species	Distributional Range			Uses									Altitudinal Range in metre (m)	Distribution	Flowering/Fruiting	Tree Habit
		HP	J&K	UK	T	M	F	Fu	Ed	A/o	R/F	S	M				
	CUPRESSACEAE																
1.	*Cupressus cashmeriana* Royle *ex* Carr.	√	√	√				+						2000-2600	India, Bhutan	Jun-Nov	E
2.	*Cupressus lusitanica* Mill.	√	√	√						+				1800-2900	India, Mexico	Jun-Nov	E
3.	*Cupressus torulosa* D.Don	√	√	√						+				1800-3000	India, Bhutan, China, Nepal	Jun-Nov	E
4.	*Juniperus communis* L.	√	√	√								+		2500-3100	India, Eurasia, Africa, America, Mexico	Sep- Nov	E
5.	*Juniperus indica* Bertol.	√	√	√								+		2900-3300	India, Pakistan, Bhutan, China, Nepal	Sep- Nov	E
6.	*Juniperus macropoda* Boiss.	√	√	√									+	2900-3300	India, Pakistan, Nepal, Bhutan, China	Sep- Nov	E
7.	*Juniperus recurva* Buch.- Ham *ex* D. Don	√	√	√				+						2900-3300	India, Afghanistan, Bhutan, China, Myanmar, Nepal, Pakistan	Sep- Nov	E
8.	*Juniperus semiglobosa* Regel	√	√	√				+						2900-3300	India, Afghanistan, China, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan	Sep- Nov	E
9.	*Juniperus squamata* Buch.-Ham *ex* D.Don	√	√	√				+						2900-3300	India, Afghanistan, Pakistan, Bhutan, Nepal, Taiwan, China	Sep- Nov	E
	PINACEAE																
10.	*Abies pindrow* (Royle *ex* D. Don) Royle	√	√	√			+							2400-3000	India, Afghanistan, Pakistan, Nepal, China, Bhutan	Mar- Nov	E
11.	*Abies spectabilis* (D.Don) Spach	√	√	√			+							2400-3000	India, Afghanistan, Pakistan, China, Nepal	Mar- Nov	E
12.	*Cedrus deodara* (Roxb. *ex* D. Don) G.Don	√	√	√									+	1500-3000	India, Afghanistan, Pakistan, China, Nepal	Sep- Dec	E
13.	*Picea smithiana* (Wall.) Boiss.	√	√	√			+							2100-3200	India, Afghanistan, China, Nepal	Mar-Jun	E
14.	*Pinus gerardiana* Wall.	√	√	√					+					2600-3200	India, Afghanistan, Pakistan, China	Mar-Jun	E
15.	*Pinus roxburghii* Sargent	√	√	√	+						+			900-2500	India, Pakistan, Afghanistan, Bhutan, China, Myanmar, Nepal	Mar-Jun	E
16.	*Pinus wallichiana* A.B.Jacks.	√	√	√	+						+			2000-3200	India, Pakistan, Afghanistan, Bhutan, China, Myanmar, Nepal	Mar-Jun	E
17.	*Tsuga dumosa* (D.Don) Eichler	√	√	√				+						2200-2800	India, Myanmar, Nepal, Bhutan, China, Vietnam	Apr-Nov	E
	TAXACEAE																
18.	*Taxus wallichiana* Zucc.	√	√	√		+								2400-3000	India, Pakistan, Bhutan, China, Indonesia, Myanmar, Nepal, Philippines, Vietnam	Apr-Nov	E

Major sources of Information: Brandis, D.(1906). *Indian Trees: An account of trees, Shrubs, Woody climbers, Bamboos and Plams: Indigenous or commonly cultivated in British Indian Empire,* Archibald Constable & Co. Ltd.; Shani, K.C. (1990). *Gymnosperms of India and Adjacent countries*, Bishen Singh Mahendra Pal Singh, Dehradun.

Table 12: Cultivated trees of Western Himalaya: Gymnosperms

S.No.	Species	Distributional Range			Uses									Altitudinal Range in metre (m)	Distribution	Flowering/Fruiting	Tree Habit
		HP	J&K	UK	T	M	F	Fu	Ed	A/o	R/F	S	M				
	ANACARDIACEAE																
1.	*Agathis robusta* (C.Moore *ex* F. Muell.) F.Bailey	√	√	√									+	2500-3000	India, Australia, Papua, New Guinea	Sep- Nov	E
2.	*Araucaria bidwillii* Hook.	√	√	√						+				2400-2800	India, Australia	Sep- Nov	E
3.	*Araucaria columnaris* (Forst.) Hook.	√	√	√						+				2400-2800	India, New Caledonia	Sep- Nov	E
4.	*Araucaria cunninghamii* Sweet	√	√	√						+				2400-2800	India, Australia, Papua, New Guinea	Sep- Nov	E
	CEPHALOTAXACEAE																
5.	*Cephalotaxus harmingtonia* Koch	√	√	√									+	2500-3000	India, China, Malaysia, Philippines	Sep- Nov	E
6.	*Cephalotaxus griffithii* Hook.f.	√	√	√									+	2500-3000	India, China, Malaysia, Philippines	Sep- Nov	E
	CUPRESSACEAE																
7.	*Callitris columellaris* F. Muell.	√	√	√									+	2200-2600	India, Australia	Sep- Nov	E
8.	*Cupressus arizonica* Greene	√	√	√				+						1800-2200	India, Mexico, Ameica	Jun-Nov	E
9.	*Cupressus funebris* Endl.	√	√	√				+						2000-2600	India, China	Jun-Nov	E
10.	*Cupressus goveniana* Gordon	√	√	√				+						2500-3200	India, California	Jun-Nov	E
11.	*Cupressus sempervirens* L.	√	√	√									+	2000-2800	India, Greece, Israel, Jordan, Lebanon, Libya, Turkey	Jun-Nov	E
12.	*Juniperus bermudiana* L.	√	√	√									+	2500-3100	India, Bermuda	Sep- Nov	E
13.	*Juniperus chinensis* L.	√	√	√									+	2300-3000	India, Myanmar, China, Japan, Taiwan, China	Sep- Nov	E
14.	*Juniperus deppeana* Steud.	√	√	√									+	2300-3000	India, Mexico, America	Sep- Nov	E
15.	*Juniperus oxycedrus* L.	√	√	√									+	2900-3300	India, Albani, Algeria, Andorra, Armenia, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Cyprus, France, Georgia, Gibraltar, Greece	Sep- Nov	E
16.	*Juniperus phoenica* L.	√	√	√									+	3000-3400	India, Albania, Algeria, Andorra Cyprus, Egypt, France, Gibraltar, Greece, Italy, Lebanon, Libya, Monaco, Montenegro, Morocc, Portugal, Saudi Arabia, Spain,Tunisia, Turkey	Sep- Nov	E
17.	*Juniperus procera* Hochst.	√	√	√				+						3000-3800	India, Congo, Djibouti, Eritrea, Ethiopia, Kenya, Malawi, Saudi Arabia, Somalia, Sudan, Tanzania, Uganda, Yemen, Zimbabwe	Sep- Nov	E
18.	*Juniperus scopulorum* Sarg.	√	√	√				+						2900-3300	India, Canada, Mexico, America	Sep- Nov	E
19.	*Thuja occidentalis* L.	√	√	√						+				2200-2800	India, Nepal, Pakistan, Taiwan, China	Sep- Nov	E

20.	*Thuja orientalis* L.	√	√	√						+				2200-2800	India, Nepal, Pakistan, Taiwan, China	Sep- Nov	E
	CYCADACEAE																
21.	*Cycas revoluta* Thunb.	√	√	√						+				2500-3000	India, Japan	Sep- Nov	E
	GINKGOACEAE																
22.	*Ginkgo biloba* L.	√	√	√		+								2200-2800	India, China	Apr-Nov	D
	PINACEAE																
23.	*Pinus canariensis* Loudon			√			+							1200-2500	India, Spain	Mar-Jun	E
24.	*Pinus caribea* Mor.			√			+							1200-2500	India, Carabia	Mar-Jun	E
25.	*Pinus densiflora* Sieb. &Zucc.			√			+							1200-2500	India, China, Japan, Korea	Mar-Jun	E
26.	*Pinus echinata* Mill.	√	√	√			+							2000-2600	India, America	Mar-Jun	E
27.	*Pinus elliotti* Engelm.			√			+							1200-2500	India, Mexico, America	Mar-Jun	E
28.	*Pinus halepensis* Mill.			√				+						2100-2700	India, Albania, Algeria, France, Greece, Italy, Lebanon, Libya, Malta, Montenegro, Morocco, Spain, Syrian Arab Republic, Tunisia	Mar-Jun	E
29.	*Pinus hartwegii* Lindl.			√				+						2100-2700	India, Mexico	Mar-Jun	E
30.	*Pinus kesiya* Role. *ex* Gordon	√	√	√				+						2000-2700	India, China, Malaysia, Philippines	Mar-Jun	E
31.	*Pinus merkusii* Jungh. & de Vriese	√	√	√			+							2000-2600	India, Indonesia, Philippines	Mar-Jun	E
32.	*Pinus oocarpa* Schiede *ex* Schltdl.			√				+						2100-2700	India, Mexico, Nicaragua	Mar-Jun	E
33.	*Pinus patula* Schildl. & Cham.			√				+						2100-2700	India, Mexico	Mar-Jun	E
34.	*Pinus radiata* D.Don			√				+						2100-2700	India, Mexico, America	Mar-Jun	E
	PODOCARPACEAE																
35.	*Podocarpus gracilior* Pilger	√	√	√									+	2500-3000	India, Burundi, Kenya, Rwanda, Sudan, Tanzania, Uganda	Sep- Nov	E
36.	*Podocarpus latifolius* (Thunb.) R.Br. *ex* Mirb.	√	√	√									+	2500-3000	India, China, Africa	Sep- Nov	E
37.	*Podocarpus macrophyllus* (Thunb.) Sweet	√	√	√									+	2200-3000	India, Nepal, Pakistan, Bhutan, China	Sep- Nov	E
38.	*Podocarpus neriifolius* D.Don	√	√	√									+	2800-3000	India, Nepal, Myanmar, China	Sep- Nov	E
	TAXODIACEAE																
39.	*Cryptomeria japonica* D.Don	√	√	√				+						2200-3000	India, Japan	Jul- Oct	E
40.	*Cunninghamia lanceolata* (Lambert) Hook.f.	√	√	√									+	2200-2600	India, China	Jul- Oct	E
41.	*Sequoia sempervirens* (D.Don) Endl.	√	√	√									+	2500-2800	India, America	Jul - Sep	E
42.	*Taxodium mucronatum* Tenore	√	√	√									+	2300-2600	India, Mexico, America	Jul - Sep	E

Abbreviations: T- Timber, M- Medicinal, F-Fodder, Fu- Fuel, Ed- Edible, A/O- Avenue/ Ornamental, R/F- Resin,/ Fibre, E-Evergreen, S- Sacred, M- Miscellaneous, HP- Himachal Pradesh, J&K- Jammu and Kashmir, UK- Uttarakhand

Abies pindrow

Plate 1. *Abies pindrow* Royle: A. Tree, B. Stem Bark, C. Female Cones, D. Male Cones

Botanical Name: *Abies pindrow* Royle

Family: Pinaceae

Vernacular Name: *Talish, Raga*

Description: Evergreen trees, up to 40 m high; young shoots glabrous; bark grey or greyish- brown. Leaves solitary, flattened, 4-8 cm long, shining green above, with two sharp points at apices. Flowers monocious; male catkin 1.2-2 cm long, clustered; stamens with 2 linear pollen sacs; connective produced. Female cones solitary or in pairs, erect, dark blue or purple; mature cone cylindric, erect; bract scales crustaceous, obovate; seeds 6-16cm long, wings longer than seeds.

Fl. & Fr.: March- November

Altitude range: 2400-3000 m

Distribution: Submontane to montane Himalaya, Kashmir to Sikkim; Pakistan, Afghanistan, Bhutan, China, Nepal

Habitat: Mountain slopes, mostly associated with *Quercus semecarpifolia* forests

Status: Least Concern (IUCN, 2015)

Importance: Bark extract with honey used in cough and bronchitis

Nativity: Native to Himalaya

Causes of threat: The species is logged for its timber in parts of its range

Acer caesium

Plate 2. *Acer caesium* Wallich ex Brandis : A. Tree, B. Fruiting twig, C. Fruits

Botanical Name: *Acer caesium* Wallich ex Brandis

Family: Aceraceae

Vernacular Name: *Tilpatra*

Description: Deciduous trees, up to 25 m high; bark grey, exfoliating in thin, vertical strips; bud scales reddish, white pubescent. Leaves 5-lobed, broader than long, 10-20 cm long; lobes serrate, cordate, acuminate, dull green above, glaucous beneath, bright red when young, base 5-nerved. Flowers 1-sexual, yellowish green, in cymosely branched terminal corymbs, appearing with the leaves; peduncle 3-6 cm long. Petals small, cream colored. Fruits glabrate, 2-jointed samara; wings divergent, erect or sometimes overlapping; nuts gibbous, dark brown.

Fl. & Fr.: March-November

Altitude range: 2000-2500 m.

Distribution: Montane Himalaya, Kashmir to Nepal

Habitat: Common in broad leaved montane forests

Status: Scarcely available

Importance: Vessels, combs and toys prepared from the wood; leaves decomposed for manure

Nativity: Native to Himalaya, sparsely distributed from Pakistan to Nepal

Causes of threat: Overexploitation for purpose of fuel

Plate 3. *Alnus nepalensis* D. Don : A. Tree, B. Stem Bark, C. Leaves with fruits

Botanical Name: *Alnus nepalensis* D. Don

Family: Betulaceae

Vernacular Name: *Utees*

Description: Deciduous trees, up to 35 m. high; bark dark- green or silvery grey. Leaves elliptic or broadly ovate, 10-18 x 7-10 cm, and paler beneath; petioles 0.7-1.5 cm long. Flowers small, appearing before leaves; male catlins slender, 4-20 cm long, green in terminal drooping panicles. Female spikes small, in axillary racemes, forming ovoid, 1.2-2 cm long cones. Nutlets with narrow membranous wings.

Fl. & Fr.: October- January

Altitude range: 1200-2700 m.

Distribution: Submontane to montane Himalaya, H.P. to Sikkim; Pakistan, Nepal, Bhutan, China and Myanmar

Habitat: Abundant along the shady ravines or on landslide zones

Status: Least concern (IUCN, 2015)

Importance: Used as soil binder

Nativity: Native to Himalaya, sparsely distributed from India to Bhutan, China and Myanmar

Causes of threat: There are no major threats reported for this species. It is very susceptible to attack by defoliators but this does not cause death tree

Betula utilis

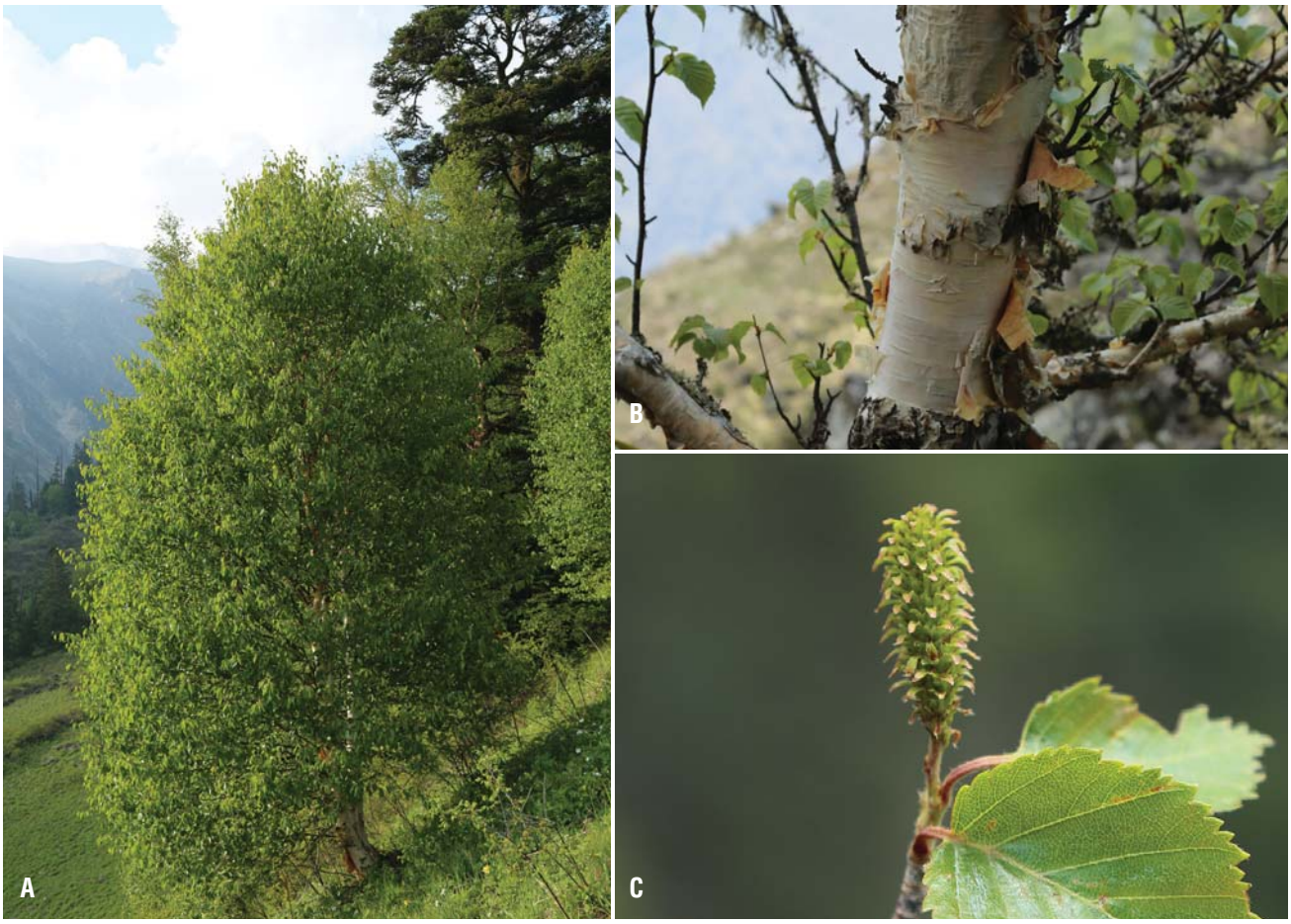

Plate 4. *Betula utilis* D.Don : A. Tree, B. Stem Bark, C. Leaves with Inflorescence

Botanical Name: *Betula utilis* D.Don

Family: Betulaceae

Vernacular Name: *Bhojpatra*

Description: Deciduous trees upto 18-20 m high, with white or brown bark; young parts pubescent. Leaves 2-3 inches long ovate or ovate- lanceolate, with rounded or cordate base; lateral nerves 7-9 pairs. Male catkins 5-8 cm. long; female catkins solitary. Nutlets with narrow wings.

Fl. & Fr.: May-November

Altitude range: 2700- 3100 m.

Distribution: Outer Himalayan range from Kashmir to North East states of India; Afghanistan, Bhutan, China, Nepal

Habitat: Rocky outcrops, hill slopes, and in association with silver fir

Status: Least Concern (IUCN, 2015)

Importance: Sacred value, bark of tree was traditionally used for writing scripts

Nativity: Native to Himalaya; found trequently in high altitude regions of Western Himalaya

Causes of threat: The main threat to this species is over exploitation

Plate 5. *Butea monosperma* (Lam.) Taub.: A. Tree, B. Flowers, C. Flowers with Pods, D. Stem Bark, E. Leaves

Botanical Name: *Butea monosperma* (Lam.) Taub.

Family: Fabaceae

Vernacular Name: *Dhak, Palash*

Description: Deciduous medium sized tree, to 15 m high, with crooked trunk and irregular, silky pubescent branches. Leaf rachis 15-25 cm long; leaflets broadly ovate or obovate; lateral leaflets oblique, smaller than terminal, cuneate or deltoid base, mature ones glaberous; petiolules 5-8 cm long; stipules and stipels small. Flowers orange red, appearing before leaves, arranged in axillary or terminal, 10-20 cm long, racemes; bracts, bracteoles and pedicels velvety. Pods pendulous, linear-oblong, 1-2 x2.5-5 cm, 2-valved, silky pubescent, 1-seeded.

Fl. & Fr.: March- July

Altitude range: Up to 1200 m.

Distribution: Throughout warmer parts of India; Sri Lanka and Pakistan

Habitat: Common, in the outer submontane tracts, associated with miscellaneous forests

Status: Common

Importance: Decoction of flowers regarded as blood purifier

Nativity: Native to Indian Subcontinent

Causes of threat: No threat is observed

Cedrus deodara

Plate 6. *Cedrus deodara* (Roxb. *ex* D.Don) G.Don : A. Tree, B. Stem Bark, C. Female Cones, D. Male Cones

Botanical Name: *Cedrus deodara* (Roxb. ex D.Don) G.Don

Family: Pinaceae

Vernacular Name: *Deodar*

Description: Evergreen tree, 40-80 m high; with spreading branches and drooping branchlets. Leaves in dense clusters, needle like, clustered at the end of branchlets, 2.5-4 cm long; pollen sacs 2. Female cone solitary at the end of the branchlets, erect, ovoid or cylindrical with numerous thin, crustaceous bract- scales; mature cones green; seeds 5-12 mm long, wings longer than seeds.

Fl. & Fr.: September- December

Altitude range: 1500- 3000 m.

Distribution: West Himalaya in India; Afghanistan, Pakistan, China, Nepal

Habitat: Moist montane forests, associated with oaks

Status: Not frequent, locally found rare

Uses: Timber; paste of bark applied externally on piles; wood oil massaged in lumbago, rheumatic arthritis and urticaria

Nativity: Native to Himalaya, rarely distributed from Afganistan to W. Nepal

Causes of threats: No threat is observed so far

Plate 7. *Mallotus philippensis* (Lam.) Muell. Arg.: A. Tree, B. Leaves, C. Fruits, D. Stem Bark

Botanical Name: *Mallotus philippensis* (Lam.) Muell. Arg.

Family: Euphorbiaceae

Vernacular Name: *Rohini, Campilak*

Description: Evergreen trees, upto 12-15 m high; bark thin, dark grey; young branches rusty tomentose. Leaves alternate, ovate or ovate- oblong to lanceolate, 6-15 x 4.5- 7.5 cm, acuminate, entire or serrate, glabrous above, pubescent, red gland dotted beneath; petioles rusty pubescent, to 8 cm. long. Flowers yellowish, uni-sexual, about 3mm across; clusters of male in terminal panicled racemes; female flowers solitary. Perianth 3-lobed. Casules 3-lobed, curved with crimson powder when ripe; seeds globose, smooth, black.

Fl. & Fr.: September- May

Altitude range: Up to 900 m.

Distribution: Greater parts of India; Sri Lanka, Taiwan, S.E. Asia, China

Habitat: Miscellaneous forests of sub Himalayan tract

Status: Locally common

Importance: Red dye obtained from the fruits; the powder also used as anthelmintic and purgative

Nativity: Philippines

Causes of threat: No threat is observed

Myrica esculenta

Plate 8. *Myrica esculenta* Buch-Ham. *ex* D. Don: A. Tree, B-C. Leaves and Fruits

Botanical Name: *Myrica esculenta* Buch-Ham. *ex* D.Don

Family: Myricaceae

Vernacular Name: *Kaphal*

Description: Evergreen tree upto 14 m high; bark brownish-grey, rough, vertically wrinkled. Leaves alternate, crowded at the end of branches, oblanceolate, 6-15 x 3-5 cm, entire, acute, glossy above, glaucous dotted below; petioles 7-14 mm long. Flowers minute, uni-sexual; male flower in 1.2-1.5 cm long, pale-brown reddish catkins, in branched axillary clusters. Female flowers in erect axillary spikes. Fruits sessile, up to1 cm long, ovoid or ellipsoid, succulent, dark red or purplish when ripe, with a rough stone .

Fl. & Fr.: August- June

Altitude range: 1200- 2800 m.

Distribution: Indian Himalayan Region; Nepal, Bhutan, China, Indonesia, Loas and Malaysia

Habitat: Under growth of oak and pine forests

Status: Common

Importance: Fruits are edible

Causes of threat: No threat is observed so far

Plate 9. *Pinus wallichiana* A.B. Jacks. : A. Tree, B. Stem Bark, C. Leaves with Cones

Botanical Name: *Pinus wallichiana* A.B. Jacks.

Family: Pinaceae

Vernacular Name: *Kail,* Blue Pine

Description: Evergreen trees, 40-45 m high; bark smooth, grey- colored and leathery, or corky with shallow fissures. Leaves slender, triquetrous, bluish green, drooping; bud scales deciduous. Male cones ovoid or oblong, 8-12 mm long. Female cones 2-3 together, cylindric, erect when young, pendulous afterwards; bract scales slightly woody with obtuse tips; seeds blackish, ovoid, acute at both ends, 5-6 mm long, wings 3-4 times longer to seeds.

Fl. & Fr.: March- June

Altitude range: 2000-3200 m.

Distribution: Temperate to Sub-alpine regions; Pakistan, Afghanistan, Nepal, Bhutan, China, Myanmar

Habitat: Occur in montane tracts, often on dryer slopes

Status: Least concern (IUCN, 2015)

Importance: Wood used for construction and resin for varnishes and paints

Nativity: Native to Himalaya

Causes of threats: Over-exploitation could negatively impact the populations

Pittosporum eriocarpum

Plate 10. *Pittosporum eriocarpum* Royle: A. Tree, B. Leaves with Fruits, C. Inflorescence, D. Stem Bark

Botanical Name: *Pittosporum eriocarpum* Royle

Family: Pittosporaceae

Vernacular Name: *Agni, Tumari, Raduthi*

Description: Evergreen, small tree, 15-20 m high. Wigs stout densely clothed with pale brown tomentum when young. Bark smooth, pale brown, with small raised circular or horizontally elongated lenticles. Leaves 10- 17 cm, oblong, lanceolate, acute, entire, brown tomentose on both surfaces, dark glossy green. Flowers 7mm long, pale yellow, in many flowered, compound, tomentose, sub umbellate. Seeds red surrounded by a viscid juice.

Fl. & Fr.: March- November

Altitude range: 900-2000 m.

Distribution: Endemic to Uttarakhand, India

Habitat: On moist hilly slopes; along with oak

Status: Endangered (IUCN, 2015)

Importance: Bark aromatic and possesses narcotic properties, used in Harpies zoster, bronchitis as well as an expectorant, febrifuge

Nativity: Native and Endemic to Western Himalaya

Causes of threat: Large-scale lime quarrying and degradation of the habitat.

Plate 11. *Quercus lanata* Sm. : A. Tree, B. Leaves with Acorn, C. Acorns, D. Stem Bark

Botanical Name: *Quercus lanata* Sm.

Family: Fagaceae

Vernacular Name: *Latta- Banj, Rianj*

Description: Evergreen trees, up to 20 m high; bark pale grey to ashy brown. Leaves oblong or elliptic lanceolate, acute or acuminate, bark glossy green, with distinct pale midrib above, rust coloured or woolly hairy beneath. Male catkins woolly haired. Female flowers solitary or in pairs. Acorns about 1.8-2 cm long, covered one third to one half by cup.

Fl. & Fr.: March-December

Altitude range: 1800-2500 m.

Distribution: Uttarakhand to North East States of India; Pakistan, Afghinastan

Habitat: Sub- montane to montane Himalaya

Status: Scarcely available

Importance: Wood used as fuel, leaves as fodder

Nativity: Native to Himalaya

Causes of threat: Poor rate of germination and over harvesting for fodder and fuel

Rhododendron arboreum

Plate 12. *Rhododendron arboreum* Sm. : A. Tree, B. Flowers

Botanical Name: *Rhododendron arboreum* Sm.

Family: Ericaceae

Vernacular Name: *Burans*

Description: Evergreen trees up to 15 m high; bark pinkish brown, rough; young twigs white or brown pubescent. Leaves oblong lanceolate, crowed towards the end of the branches, narrowed at both ends, entire, dark green, glabrous above, white or rusty brown tomentose beneath; petioles 0.51-1.5cm long. Flowers deep red, crowed in large, globose, terminal, compact, corymbs. Calyx small; lobes pale yellow, widely ovate, scarious. Corolla bright, pink-red, campanulate; lobes 5, recurved, fringed. Stamens 10; filamentous white. Ovary 6-10 celled, ferruginous woolly. Capsules cylindric, 1.5-2 cm long, ribbed, curved; seeds many, ellipsoid.

Fl. & Fr.: February- August

Altitude range: 2200 - 3000 m.

Distribution: Indian Himalayan Region; Pakistan, Nepal, China and Myanmar

Habitat: Common in Oak forests

Status: Common

Importance: Flowers eaten raw or made in to refreshing drinks, medicinal for digestive and respiratory disorders

Nativity: Native to Himalaya

Causes of threat: No threat is observed so far

Plate 13. *Shorea robusta* Roxb. *ex* Gaertn.: A. Tree, B. Stem Bark, C. Inflorescence, D. Flowers

Botanical Name: *Shorea robusta* Gaertn.

Family: Dipterocarpaceae

Vernacular Name: *Saal*

Description: Sub-deciduous; trees; upto 30 m tall; bark reddish brown or grey, rough; young branches rusty tomentose. Leaves broadly ovate- oblong, rounded or cordate at base, acuminate or obtuse at tip, glabrous and shining when matured, 12-15 pairs of lateral nerves. Flowers creamy- yellow, shortly stalked, unilateral on the racemose branches, of axillary, 7-22 cm long panicles, branches grey tomentose. Sepals 5, unequal, ovate, hairy. Petals 5, connate at base, lanceolate, silky outside. Stamens many; connective produced above anthers, trifid. Ovary globose, pubescent. Fruits ovoid 1.2-1.8 cm long, acuminate with three large and 2 small wings.

Fl. & Fr.: March-July

Altitude range: Upto 1300 m.

Distribution: Sub Himalayan tracts from Himachal to Assam in India; Nepal, Bhutan, China

Habitat: Dominant constituent of mixed forests of sub Himalayan tract

Status: Least concern (IUCN, 2015)

Importance: Highly used for timber

Causes of threat: Excessive use for timber

Taxus wallichiana

Plate 14. *Taxus wallichiana* Zucc.: A. Tree, B. Leaves, C. Fruit, D. Stem Bark

Botanical Name: *Taxus wallichiana* Zucc.

Family: Taxaceae

Vernacular Name: *Thuner*

Description: Evergreen tree, to 25 m high; bark reddish-grey. Leaves distichous, linear, flattened, acute, yellowish, rusty beneath, glossy-green above, 2-3.5cm long. Male flowers pedicelled whorls of 3-8 anther cell on peltate scale. Female flower with single erect ovule, surrounded by a disc. Fruit red, fleshy, to 8mm long, often 1-seeded.

Fl. & Fr.: April-November

Altitude range: 2400- 3000 m.

Distribution: Montane Himalaya upto Arunachal Pradesh in India; Pakistan, Bhutan, China, Nepal, Indonesia, Myanmar, Philippines, Vietnam

Habitat: Common in moist- shady montane forest

Status: Endangered (IUCN, 2015)

Uses: 'Taxol' an anti-cancerous alkaloid is extracted from the leaves; bark is used traditionally as an ingredient of tea; timber

Nativity: Native to Himalaya

Threat: This species has been heavily exploited for its leaves and bark

Govind Ballabh Pant Institute of Himalayan Environment & Development

About the Institute

G.B. Pant Institute of Himalayan Environment and Development (GBPIHED) was established in 1988–1989 as an autonomous institute of the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India. The Institute has been identified as focal agency to advance scientific knowledge, to evolve integrated management strategies, demonstrate their efficacy for conservation of natural resources, and to ensure environmentally sound management in the entire Indian Himalayan Region (IHR).

About the Task Force

The National Action Plan on Climate Change (NAPCC) recognizes the Himalayan ecosystem as vital for preserving the ecological security of the country. Also, it underlines intense vulnerability of this ecosystem towards both anthropogenic and environmental perturbations. Accordingly, NAPCC sets out 'National Mission for Sustaining Himalayan Ecosystem' (NMSHE) as one and the only area-specific mission among the eight National Missions, which envisages to take appropriate measures for sustaining and safeguarding the glaciers and mountain ecosystems. The mission, anchored by the Department of Science and Technology (DST), GoI, New Delhi, encompasses six thematic Study Groups or Task Forces and G.B. Pant Institute of Himalayan Environment and Development (GBPIHED) has been assigned with responsibilities as Nodal Institute for Task Force 3: 'Forest Resources and Plant Biodiversity'.

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