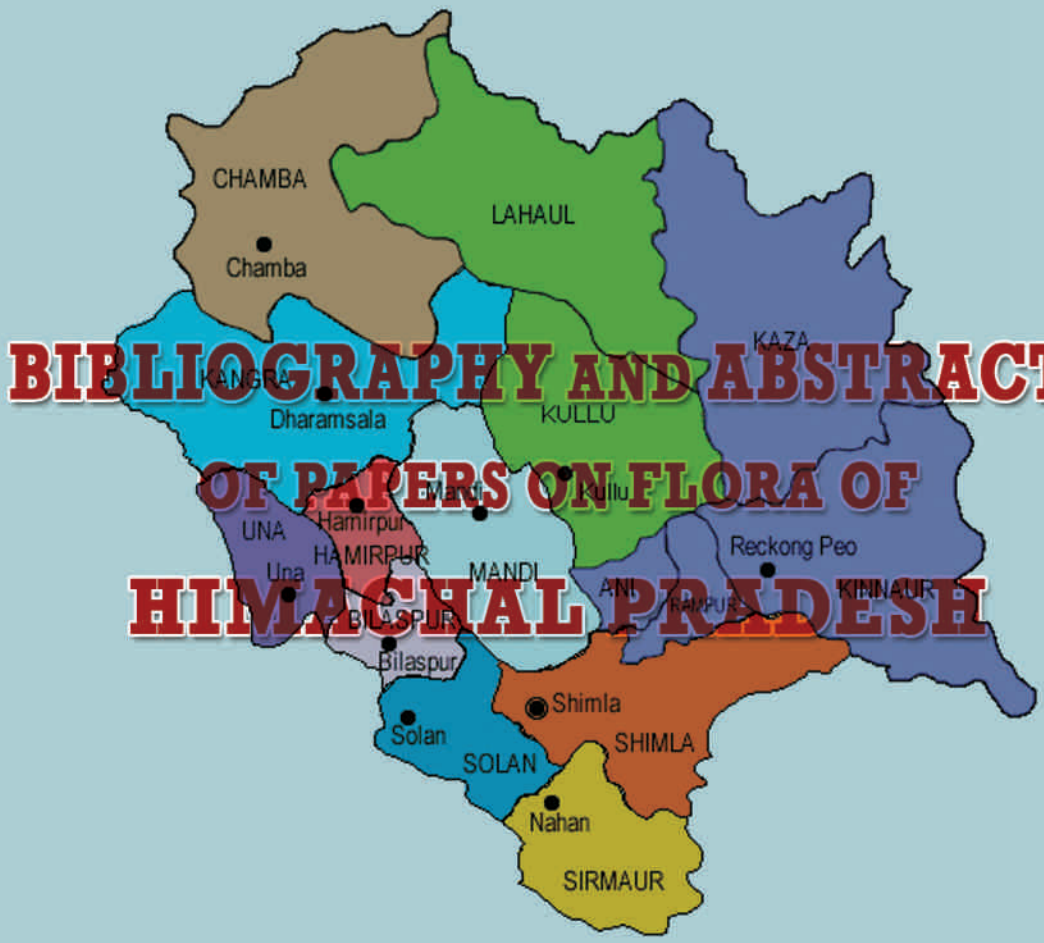
United Nations Decade on Biodiversity



BIBLIOGRAPHY AND ABSTRACTS OF PAPERS ON FLORA OF HIMACHAL PRADESH

Ministry of Environment, Forest & Climate Change

WORKING TOWARDS A SUSTAINABLE ENVIRONMENT
ENVIS INDIA

भारतीय वनस्पति सर्वेक्षण
BOTANICAL SURVEY OF INDIA

ENVIS Resource Partner on Biodiversity

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2020

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Compiled by

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under ENVIS Programme

भारतीय वनस्पति सर्वेक्षण
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2020

ISBN 978819452293-5

ENVIS
Government of India
Ministry of Environment, Forest and Climate Change

EI – Division

- Economic Advisor : Mr. Yashvir Singh
- Website : http://www.envis.nic.in

ENVIS RESOURCE PARTNER ON BIODIVERSITY
Botanical Survey of India

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FOREWORD

The ENVIS Resource Partner on Biodiversity of the Botanical Survey of India has been publishing Bibliography and Abstracts of Papers pertaining to Floras of States and Union Territories of India. In this attempt, the Centre has already published consolidated bibliography and abstracts of papers on flora of West Bengal (in two parts), North East India – I, Andaman & Nicobar Islands, Maharashtra, Kerala, Tamil Nadu, Karnataka, Goa, Andhra Pradesh (including Telangana), Odisha, Bihar & Jharkhand and Madhya Pradesh & Chhattisgarh. In continuation to this series of publication, compilation of wide range of papers pertaining to the flora, vegetation, ethnobotany and issues related to traditional knowledge and conservation of plant resources of Himachal Pradesh has been compiled by the ENVIS Resource Partner on Biodiversity, BSI.

In November 1, 1966 when different hilly areas of Punjab – the districts of Kulu, Kangra, Simla, Lahul and Spiti, Nalagarh area of Ambala district, parts of Una Tehsil of Hoshiarpur district, Pathankot Tehsil of Gurdaspur district were merged to form the state of Himachal Pradesh, the region was given the full status of an autonomous State in January, 1971, as the eighteenth State of the Republic of India. Himachal Pradesh, the 18th largest by geographical cover (55,673 sq. km) and 21st largest in terms of population lies in the northern part of India at geo-coordinates between 30°22'04"–33°12'40" East latitude and 75°47'55" – 79°04'22" North longitude. It shares its border with Jammu & Kashmir in North, Punjab in West and South West, Uttarakhand in South East, Tibet (China) in East and Haryana in South. The state spreads over an area of 55,673 sq. km comprising of 595 km of mountain ranges spreading along the Indus-Sutlej river system, their height varying from 244–6975 m above sea level. Physiographically, the state can be recognized into 3 zones i.e., 1) The Outer Himalayas or The Shivaliks, 2) The lesser Himalayas or the Central Zone and 3) The Great Himalayan and Zaskar or the Northern Zone, whereas administratively, it has been divided into 12 districts, with Shimla as the capital city.

The Recorded Forest Area (RFA) in the state is 37,033 sq. km, out of which 1,898 sq. km is reserve forest, 33,130 sq. km is protected forest and 2,005 sq. km is unclassed forests. The protected area network in the state has 5 National Parks, 28 Wildlife Sanctuaries and 3 Conservation Reserves, covering 15.10% of the geographical area of the state.

Forest in this state currently covers an area of nearly 37,939 sq. km, which is about 68.16% of the total land area of the state. Himachal Pradesh is among the most heavily forested Indian states with 38.9% of the area as forest land but this is no reason for complacency as the continuous anthropogenic activities like, growth of apple orchards and potato farms, the building of roads and the felling of trees are all taking its toll on the forested land. Resins (from *Pinus* spp.), timber (*Betula*, *Cedrus* and *Pinus*) and firewood are some of the major products obtained from the forests of the state. The area is also rich in endangered medicinal plants like *Aconitum, Arnebia, Artemisia, Berberis, Dioscorea, Ephedra, Gentiana, Podophyllum,* etc. *Saussurea lappa* which is cultivated in Lahul valley is another such endangered medicinal plant. The analysis on the angiospermic flora of Himachal Pradesh in 1984 reported the occurrence of 1202 species of flowering plants belonging to 180 families.

The present work was initiated with an objective to compile the scattered literature to prepare a comprehensive bibliography and abstracts of research articles, Floras/books pertaining to the rich and diverse flora of Himachal Pradesh state. This present issue of bibliography and abstracts of papers on flora of these two state consists a total of 1017 references, including 325 on flora, vegetation, forestry and ecology, 219 references on fungi, lichens and algae, and other non-flowering plant groups and gymnosperms, 155 references on new discovery, new reports, rediscovery, 17 references on endemism, IUCN threat status and conservation, and 301 references on ethnobotany, sacred groves and medicinal plants. An electronic version of this publication will be made available on ENVIS-BSI website (www.bsienvis.nic.in).

Botanical Survey of India
Kolkata

(**A.A. Mao**)
Director

INTRODUCTION

Himachal Pradesh, located in Northern India, shares its border with Jammu & Kashmir in the North, Punjab in the West and South West, Uttarakhand in the South East, Tibet (China) in the East and Haryana in the South and lies between 75°47'55"–79°04'22" N and 30°22'04"–33°12'40" E. It is the 18th largest state by geographical cover (55,673 sq. km) and 21st largest state in terms of population of India. The state spreads over an area of 55,673 sq. km comprising of 595 km of mountain ranges spreading along the Indus-Sutlej river system, their height varying from 244–6975 m above sea level. Physiographically, the state can be recognized into 3 zones i.e., i) The Outer Himalayas or The Shivaliks, ii) The lesser Himalayas or the Central Zone and iii) The Great Himalayan and Zaskar or the Northern Zone, whereas administratively, it has been divided into 12 districts, with Shimla as the capital city.

Topography and Soil: Himachal Pradesh is situated in the western Himalayan biotic province within the Sino-Himalayan subzone of the Boreal biogeographic zone. The entire region of this state is hilly with altitude ranging from 244–6975 m above sea level. The soil type and texture varies from place to place in the state. The soil below 1000 m altitude is generally sandy loam varying from light grey to brown, and on hilly slopes between 1000–1600 m altitude generally loam or silt loam with fine texture from grey to black, between 1600–2200 m altitude varying from silt loam to dry loam with less gravel and dark brown and above 2200 m, the soil is silty loam to loams, dark brown and acidic in nature.

Climate: There is a great diversification in the climatic conditions of the state due to variation in elevation (250–7000 m). It varies from hot and sub-humid tropical (250–900 m) in the southern low tracts, warm and temperate (900–1800 m), cool and temperate (1900–2400 m) and cold alpine and glacial (2400 to above 5000 m) in the northern and eastern high mountain ranges. The year is divided into three seasons, i.e. cold (October to February), hot (March to June) and rainy (July to September). The average annual rainfall of the state is about 182 cm. The northern region has less rainfall as compared to the southern parts. Maximum annual rainfall is noticed at Dharmasala (3400 mm) in Kangra district whereas, areas near Indo-Tibetan border are arid, dusty with heavy snow fall and are covered with snow nearly from December to May. The temperature also varies throughout the state.

Water Resources: Himachal Pradesh provides water to both the Indus and Ganges basins. The major river systems of the region are the Chandrabhaga or the Chenab, the Ravi, the Beas, the Sutlej and the Yamuna. The river Beas originates from 'Vyas Kund', the Pir Panjal range near Rohtang Pass and flows some 256 km in Himachal Pradesh. Apart from these, Baspa, Paber, Giri, Gambhar etc., are some other important rivers which ultimately join the main rivers. These perennial rivers are fed by snow and rainfall and are protected by a fairly extensive cover of natural vegetation.

Vegetation/Forest: Himachal Pradesh with its undulating topography, varying degrees of altitudes ranging from 300 m to nearly 7000 m, subtropical to subarctic climate has diverse

and rich vegetation from tropical deciduous to alpine meadows and cold deserts. The Recorded Forest Area (RFA) in Himachal Pradesh is 37,033 sq. km, out of which 1,898 sq. km is reserve forest, 33,130 sq. km is protected forest and 2,005 sq. km is unclassed forests. Forests in this state currently cover an area of nearly 37,939 sq. km, which is about 68.16% of the total land area of the state. The state is among the most heavily forested Indian states with 38.9% of the area as forest land, but this is no reason for complacency as the growth of apple orchards and potato farms, the building of roads and the felling of trees are all taking its toll on the forested land. The vegetation of this state can be broadly classified into: i) tropical (below 1000 m), ii) subtropical (between 1800–2000 m), iii) temperate (between 1800–3500 m), iv) subalpine (between 3500–4000 m) and v) alpine (above 4000 m).

The common floral elements of tropical vegetation in the state are: *Albizia procera, Anogeissus latifolia, Buchanania lanzan, Dendrocalamus strictus, Grewia optiva, Holoptelea integrifolia Mallotus philippensis, Murraya koenigii, Nyctanthes arbor-tristis, Phanera vahlii, Shorea robusta, Toona ciliata* and *Woodfordia fruticosa*. Some common constituents of subtropical vegetation are: *Acacia catechu, Chrysopogon* spp., *Euphorbia royleana, Olea cuspidata, Pinus roxburghii, Punica granatum, Rhododendron arboreum, Rhus semialata, Rubus ellipticus, Saccharum* spp., *Themeda* spp., *Terminalia chebula* and *Zanthoxylum alatum*. Some common floral elements of temperate vegetation are *Adhatoda zeylanica, Betula alnoides, Betula utilis, Capparis spinosa, Cedrus deodara, Colebrookea oppositifolia, Dalbergia sissoo, Fragaria vesca, Haldina cordifolia, Hedera nepalensis, Litsea umbrosa, Lonicera angustifolia, Pinus gerardiana, Quercus incana, Rosa macrophylla* and *Rhododendron arboreum*, etc. Subalpine vegetation constitutes *Anemone* spp., *Berberis* spp., *Betula utilis, Cotoneaster* spp., *Gentiana* spp., *Geranium* spp., *Juniperus communis, Pedicularis* spp., *Ranunculus* spp., *Rosa* spp. and species *Rhododendron* like *R. anthopogon, R. campanulatum* and *R. lepidotum*. Lastly the floral elements of Alpine vegetation are *Androsace* spp., *Dactylorhiza hatagirea, Meconopsis* spp., *Gentiana* spp., *Polygonum* spp., *Primula* spp., *Rhododendron anthopogon, Rumex* spp. and *Saxifraga* spp.

Plant Diversity: The state harbours a total of 2,571 species under 1038 genera belonging to 180 families of flowering plants (Chowdhery, 1999). Of these, 1890 species in 821 genera and 153 families belongs to dicotyledons and 681 species in 217 genera and 27 families belongs to monocotyledons. Asteraceae with 328 species are the largest family in the state followed by Poaceae (321 spp.), Leguminosae (278 spp.), Rosaceae (157 spp.), Scrophulariaceae (138 spp.), Lamiaceae (136 spp.), Cyperaceae (125 spp.), Ranunculaceae (116 spp.), Apiaceae (92 spp.) and Brassicaceae (83 spp.), whereas among the genera, *Carex* (48 spp.) is the largest genus followed by *Polygonum* (37 spp.), *Poa* (33 spp.), *Gentiana* (28 spp.), *Epilobium* (26 spp.), *Pedicularis* (26 spp.), *Cotoneaster* (25 spp.), *Saussurea* (25 spp.), *Cyperus* (23 spp.) and *Euphorbia* (23 spp.).

Endemic and Rare Plants: A large number of endemic taxa found in Himachal Pradesh are *Agropyron schugnanicum* (Poaceae), *Anaphalis himachalensis* (Asteraceae), *Aquilegia nivalis* (Ranunculaceae), *Astragalus grahamianus* (Fabaceae), *Christolea stewartii* (Brassicaceae),

Deyeuxia simlensis (Poaceae), *Euphrasia jaeschkei* (Scrophulariaceae), *Ferula jaeschkeana* (Apiaceae), *Juncus rohtangensis* (Juncaceae), *Lagotis kunawurensis* (Scrophulariaceae), *Meconopsis bikramii* (Papaveraceae), *Poa lahulensis* (Poaceae), *Pseudomertensia lahulensis* (Boraginaceae), *Saussurea atkinsonii* (Asteraceae), *Silene eduardi* (Caryophyllaceae), *Tanacetum himachalensis* (Asteraceae), *Viola jangiensis* (Violaceae) and *Trigonella upendrae* (Fabaceae). Some of the rare flowering plant taxa in the state are: *Aconitum heterophyllum, Anemone tetrasepala, Arnebia euchroma, Dactylorhiza hatagirea, Ephedra gerardiana, Ferula jaeschkeana, Hyoscyamus niger, Limosella aquatica, Mahonia jaunsarensis, Nardostachys jatamansi, Picrorrhiza kurroa, Podophyllum hexandrum, Primula schlagintweitiana, Saussurea obvallata, Valeriana jaeschkii* and *Waldheimia stoliczkae.*

Forest Resources: In Himachal Pradesh, the local population consumes a large number of wild plants as edible fruits, vegetables, medicines, etc. which are directly collected from the forest. Some of the important groups of wild useful plants are wild edible plants, medicinal and aromatic plants, oil yielding plants, gum and resin yielding plants, dye yielding plants, timber yielding plants, fodder plants, incense and perfume yielding plants, wild ornamental plants, plants of religious belief and plants of botanical curiosities.

Tribal Population: This state has a large area under tribal belt which covers two districts of Lahaul & Spiti and Kinnaur alongwith Bharmaur & Pangi Development blocks of Chamba district. Geographically about half of the area of the state is covered under tribal belt whereas the population here is just 2.2 lakhs i.e. 4.2 percent of the total population of the state (1991). Gaddi, Gujjar, Jad, Bhot, Kinnaura, Lahaula, Pangwala, Swangla are the major tribal communities in the state.

Protected Areas: The state has five National Parks and 32 Wildlife Sanctuaries, together covering a total forest area of 37,939 sq. km and constitutes 68.16% forest area to total geographical area of the state. The state has five National Parks (NP) i.e. Great Himalayan NP (754 sq. km), Inderkilla NP (104 sq. km), Khirganga NP (710 sq. km), Pin Valley (675 sq. km) and Sibalbara NP (19.03 sq. km).

Botanical History: The earliest attempt to collect plants from Himachal Pradesh was made by William Moorcroft (1765–1825) who collected plants from Kangra, Kulu, Lahul and Spiti in 1821. The countess of Dalhousie was the first to collect plants from Shimla in 1829. She collected about 600 species between April and October. J.R. Royal (1800–1858) made extensive collections in Bashahr, Kinnaur and Shimla around 1830. Victor Jacquemont (1801–1832), a French botanist visited the regions of Kinnaur and Spiti on the borders of Tibet and Shimla in 1830 and in the same year R. Inglis also collected plants from Himachal Pradesh. Others who collected in and around Shimla were Col. Munro (1818–1880), Lt. Col. Edward Madden (1805–1856), J.E. Winterbottom (1803–1854), Richard Strachey (1817–1908). Lord William Hay and Lance collected plants from different places of Himachal Pradesh. R.S. Simpson made collections from Shimla in 1847 and in the same year William Hawtayne

Parish made collections from Mandi and Kulu. Sir Henry Collett collected plants from Shimla and adjacent areas in 1885. J.S. Gamble made vast collection from Shimla and its neighbouring areas in 1877. In 1881, D. Brandis made collections from Bashahr and other areas, J.F. Duthie (1845–1922) made collection trips to different places of Himachal in 1892 and 1893. J.H. Lace and G.A. Gammie made collections from Chamba and adjacent areas from 1891-1896.

R.N. Parker made extensive collections from Kulu, Bashahr from 1919–1936, in 1934, Parkinson made collections from Parbatti valley and other areas of Himachal Pradesh and in the same period Walter Koelz and Rupchand Thakur also made collections from different places of Himachal Pradesh. N.L. Bor made extensive collections from Lahaul and adjacent areas in 1941. Among other collectors from this area were S.P. Sethi, M.V. Laurie, C.R. Brown, G.S. Puri and M.B. Raizada in the 1900th century. In 1950, S.K. Jain made collections from Parbati valley in 1950.

Threats to the Biodiversity: The cause of threat to the nature and its resources are almost similar all over the world in the form of natural and man-made causes. Floods, soil erosion, landslides, earthquakes, natural competition between the species, biology of species mainly the pollination in the absence of suitable pollinator, natural regeneration, diseases and extension of the alien weedy elements etc. are some of the major natural causes responsible for the destruction of the natural vegetation. The major man-made causes are: population explosion, timber for building purposes, furniture, fuel wood, grazing and fodder, forest fires, exploitation of economically important plant species, development activities and agriculture.

These above stated causes have alarmingly reduced the forest cover resulting in severe loss of natural living and non-living resources. Therefore it is necessary to conserve the available natural resources through various effective conservational programmes.

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Chowdhery, H.J. 1999. *Himachal Pradesh.* In: Mudgal, V. & Hajra, P.K. (Eds.), *Floristic Diversity and Conservation Strategies in India.* Vol. II. Botanical Survey of India, Calcutta, pp. 845–904.

Chowdhery, H.J. & Wadhwa, B. M. 1984. *Flora of Himachal Pradesh: Analysis.* Vols. 1–3. Botanical Survey of India, Howrah.

HIMACHAL PRADESH

Flora, Vegetation, Forestry and Ecology

1. **Agrawal, Sunita. 1984.** "Note on *Gentiana clarkei* Kusn. var. *acuminata* (Clarke) Kusn. (Gentianaceae)". *J. Econ. Taxon. Bot.* 5(2): 433–435.

   Abstract: *Gentiana clarkei* Kusn. (syn. *G. pygmaea* Clarke) is treated as a synonym of *Gentiana prostrata* Haenke and a new combination *G. prostrata* Haenke var. *acuminata* (Clarke) Sunita, has been proposed for *G. clarkei* Kusn. var. *acuminata* (Clarke) Kusn. *G. prostrata* Haenke var. *acuminata* (Clarke) Sunita was distributed in Jammu & Kashmir, Himachal Pradesh and Uttar Pradesh.

2. **Agrawal, Sunita. 1984.** "Studies on *Gentiana aquatica* L. and its allies (Gentianaceae)". *J. Econ. Taxon. Bot.* 5(2): 436–438.

   Abstract: After critical taxonomic and nomenclatural studies *Gentiana pseudoaquatica* Kusn. has been reduced as a variety of *Gentiana aquatica* L. and *Gentiana burkillii* H. Smith as a synonym of *G. pseudoaquatica* Kusn. [= *G. aquatica* L. var. *pseudoaquatica* (Kusn.) Sunita].

3. **Ahmad, M., Uniyal, S.K. & Singh, R.D. 2018.** "Patterns of alien plant species richness across gradients of altitude: Analyses from the Himalayan state of Himachal Pradesh". *Trop. Ecol.* 59(1): 35–43.

   Abstract: The spread of alien plant species in bio-rich mountains calls for documenting their distribution across altitudes. The present study, therefore, analysed altitudinal distribution of alien species richness in the Himalayan state of Himachal Pradesh and tested the null hypothesis that- alien species richness in Himalaya is independent of altitude. For this, information on alien species was collated from published literature. As the zone above 5000 m is mostly snow-covered and devoid of major vegetation in the Himalaya, the altitudinal range from 300–5000 m was divided into bands of 100 m each. If a species was reported occurring from 300 to 600 m, then it's presence was counted in the 300–400 m, 400–500 m, and 500–600 m bands. All the species occurring in these individual 100 m bands were tabulated. For comparisons of alien species richness along altitude, five altitudinal groups were identified (>1000, 1000–2000, 2000–3000, 3000–4000 and 4000–5000). Their richness across and between these group was statistically compared using R. Alien species richness was maximum in the 1000–1100 m band, and significantly varied along the altitudinal gradient. Life form analyses revealed the absence of alien climbers above 2500 m. Alien species distribution patterns are in contrast to the native species distribution whose maximum richness is reported at mid-altitudes (2000–2500 m). This may be because most of

the alien species are tropical in origin and have been introduced at lower altitudes. Interestingly, alike the native species, members of Asteraceae, Fabaceae, and Poaceae dominated the alien flora along the entire altitudinal gradient.

4. **Aitchison, J.E.T. 1868.** "Lahul, its flora and vegetable products". *J. Linn. Soc., Bot.* 10: 69–101.

5. **Ambrish, K., Dogra, K.S., Srivastava, S.K., Kant, Rajni & Kharakwal, Kapil. 2017.** "Vegetation types and floral composition of Himachal Pradesh, Western Himalaya: An overview". *Phytotaxonomy* 17: 123–127.

Abstract: The present paper provides information about the vegetation types and floral composition of Himachal Pradesh based on field surveys, herbarium studies and literature. The altitudinal range of Himachal varies from 500 m to 6800 m and divided in outer and inner Himalayan zones. Himachal Pradesh having tropical, subtropical, temperate, subalpine and alpine vegetation represents c 3950 number of plant species. Five dominant families with number of genera and species are also provided for showing the floral composition in the state.

6. **Aswal, B.S. 1994.** High altitude flora of Western Himalaya: Pecularities and conservation. In: Pangtey, Y.P.S. & Rawal, R.S. (Eds.), *High Altitude of the Himalaya*. Gyanodaya Prakashan, Nainital, Pp. 76–88.

7. **Aswal, B.S. & Mehrotra, B.N. 1980a.** "Contribution to the flora of Lahaul Valley (North-West Himalaya)-I. Some new plant records". *Indian J. Forest.* 3(2): 154–155.

Abstract: Systematic studies on the flora of Lahul valley in Lahul and Spiti district of Himachal Pradesh have revealed 20 taxa of angiosperms, hitherto not recorded from this valley.

8. **Aswal, B.S. & Mehrotra, B.N. 1980b.** "Contribution to the flora of Lahul Valley (North-West Himalaya)–II. Some new plant records". *J. Econ. Taxon. Bot.* 1: 115–117.

Abstract: Systematic studies on the flora of Lahul valley in Lahul and Spiti district of Himachal Pradesh have revealed 15 taxa of angiosperms, hitherto not reported from this valley. Six species are new to the flora of Himachal Pradesh.

9. **Aswal, B.S. & Mehrotra, B.N. 1981.** "Contribution to the flora of Lahul Valley (North-West Himalayas): III. A note on the nomenclature of some plants". *J. Econ. Taxon. Bot.* 2: 236.

Abstract: In the present paper *Galium pauciflorum* Bunge has changed to *Galium tibeticum* Aswal & Mehrotra, *Tanacetum longifolium* Wall. ex DC. changed to *T. himachalensis* Aswal & Mehrotra and *Campanula colorata* Wall. changed into C. *pallida* Wall. These plants are reported from Himachal Pradesh from Lahul valley.

10. **Aswal, B.S. & Mehrotra, B.N. 1983.** "Contribution to the flora of Lahul Valley (North West Himalayas)–IV. Some new plant records". *Indian J. Forest.* 6(4): 314–318.

Abstract: The present communication deals with the geographical location, brief history of plant exploration and 13 taxa of angiosperms, hitherto not recorded from Lahul valley (North West Himalayas). A brief description depicting the salient features of each species is also provided.

11. **Aswal, B.S. & Mehrotra, B.N. 1985.** "Contribution to the flora of Lahul Valley (North-West Himalayas)–V. Phytogeographical aspects". *J. Econ. Taxon. Bot.* 7(2): 299–307.

Abstract: The present communication deals with the phytogeographical aspects of the flora of Lahul valley in the North-West Himalayas, representing 935 taxa of angiosperms. Detailed studies have revealed that the flora of Lahul valley shows more affinity with the mountain flora of the Middle Asia, although a large number of plants are common to those of Eurasia, the Mediterranean region, the Chinese mountains and the higher plateau of Tibet. The valley has some cosmopolitan weeds, besides a few plants are common to the species of the other mountain regions of India. A brief sketch of the phytogeographical aspects of the Himalayas in general and the North-West Himalayas in particular is also presented here for better understanding of the flora of this valley.

12. **Aswal, B.S. & Mehrotra, B.N. 1985.** "Flora of Himachal Pradesh– Some additional notes". *Indian J. Forest.* 8(4): 310–317.

Abstract: The present communication enumerates 103 taxa of flowering plants from Himachal Pradesh including 55 taxa from Lahul & Spiti district. Incidentally, the flora of Himachal Pradesh-analysis published by Chowdhery & Wadhwa in 1984 misses out these 103 taxa.

13. **Aswal, B.S. & Mehrotra, B.N. 1994.** *Flora of Lahul-Spiti – A cold Desert in North West Himalaya.* Bishen Singh Mahendra Pal Singh, Dehra Dun.

Abstract: This book deals with the systematic treatment of 985 species belonging to 353 genera and 79 families of angiosperms and gymnosperms. Among the 985 species, 797 are dicots, 180 monocots and 8 gymnosperms.

14. **Attar, S.K., Kumar, K. & Jha, S.K. 2014.** "Diversity analysis in Persian Walnut (*Juglans regia* L.) trees of Shimla Hills". *Indian Forester* 140(8): 789–792.

Abstract: To explore the genetic diversity in Persian walnut (*Juglans regia* L.) trees in Shimla (Himachal Pradesh). 212 unevenly managed trees were screened for yield and biomass contributing characters. Maximum values of coefficients of variability were recorded for nut yield (68.42%) followed by yield efficiency (66.01%). Based on nut yield, trunk and leaf characteristics the intra-specific variability was assessed using non-hierarchical Euclidean cluster analysis. All genotypes were grouped into eight clusters showing non-parallelism between geographic and genetic diversity. Genotypes of cluster 1 and 8 were highly diverse from each other having inter-

cluster distance of 28.30. The mean 2 values of trunk cross-sectional area (cm) were higher (1262.06) and (1005.52) in genotypic clusters 1 and 5, respectively. Genotypes of cluster 3 recorded highest nut yield (27.32 kg/tree) and were selected for their further evaluation in agroforestry systems.

15. **Awasthi, A. & Tamot, P. 2010.** "Water quality assessment of three tributaries of Beas drainage system in Himachal Pradesh in upper reaches of Himalayan region". *Biol. Forum- An Int. J.* 2(1): 63–66.

Abstract: Himachal Pradesh is a hill state in Western Himalayas, located between 30°22' to 33°12' North latitude and 75°47' to 79°4' East longitudes. Beas is one of important river of Himachal Pradesh which originates at an elevation of 14,308 feet (4361m) in the Rohtang glacier at Beas Kund (Lahul-Spiti). River Beas comprises a stretch of 923 kms including 297 kms main river and 623 kms of its tributaries. Recent reviews indicates that land degradation, forest loss, biodiversity and habitat degradation and pollution of fresh water are increasing hence this limnobiological study of three tributaries of Beas drainage system is an integrated approach to assess the water quality of tributaries of River Beas in Palampur. The present investigations consist of the analysis of important water quality parameters. Samples were collected between 9am-10am from site I, site II and site III (Poon, Awa, Mole) fortnightly and subjected for analysis in the laboratory by Following the Standard Methods for Examination of Water & Waste Water (APHA, 1995) It is suggested that, water of all three tributaries viz. site I (Poon), Site II (Awa) and Site III (Mole) was found suitable for drinking purpose and will be helpful to solve the problem of drinking water in metropolitan cities. This can be supplied as drinking water after primary treatment at national level.

16. **Badola, H.K. & Butola, J.S. 2005.** "Effect of ploughing depth on the growth and yield of *Heracleum candicans*: A threatened medicinal herb and a less-explored potential crop of the Himalayan region". *J. Mountain Sci.* 2(2): 173–180.

Abstract: This paper examines the effect of ploughing depths (A- 60 cm, B- 45 cm and C- 30 cm) on the growth and yield of *Heracleum candicans* Wall. (Apiaceae), a threatened medicinal herb of the Himalayan region. This less-explored plant is being suggested as a potential crop for the mountain agriculture. The study was carried out in an orchard in Himachal Pradesh, India at 2500 m altitude, for two successive growth years. During the first year, all plants remained in juvenile state; in the second year, nearly 65 % plants produced flowers only under 60 cm ploughing depth. Among its morphological traits, plant height, collar diameter and aboveground fresh weight were found to be strongly correlated ($P<0.01$) with the belowground biomass during the first year ($r=0.968$, 0.925 and 0.973, respectively) and during the second year ($r=0.945$, 0.928 and 0.775, respectively). Increase in the ploughing depth was

significantly correlated ($P<0.01$) with all growth parameters, including the belowground dry weight, marketable portion of the produce. The belowground biomass (commercial yield; 16.28 Qt/hec) at depth A was about 2.6 and 4.7 times higher than those recorded at depths B and C, respectively. The results clearly justify the importance of deep ploughing and this paper strongly recommends it for economically sustainable cropping.

17. **Balodi, B. & Kumar, S. 2002.** "Altitudinal distribution and association of *Betula utilis* D. Don in Western Himalaya". *Phytotaxonomy* 2: 106–107.

Abstract: *Betula utilis* D. Don (Bhojpatra) is a well known tree since time immemorial. In Western Himalaya (Jammu & Kashmir, Himachal Pradesh and Uttarakhand), it is generally said to form the tree line above 3300 m, which sometimes is not in the case. Extensive field surveys in the region have revealed that *Betula utilis* occurs even at lower altitudes around 2400 m in association with species like *Prunus cornuta, Syringa emodi, Pinus wallichiana*, etc. At certain places, *Pinus wallichiana* replaces *Betula utilis* to form the tree line. The paper deals with different association and altitudes inhabiting *Betula utilis* besides the economical aspect of this sacred tree.

18. **Balodi, B. & Rao, R.R. 1991.** "The genus *Trigonella* L. (Fabaceae) in North-West Himalaya". *J. Econ. Taxon. Bot.* 15(1): 185–194.

Abstract: Taxonomy and distribution of the genus *Trigonella* L. in North-West Himalaya is dealt here. 12 taxa including one new species, one new variety and one new record for India are treated with keys, description and illustrations. Few species are clearly endangered calling the attention of conservationists. Economic importance of the group is also highlighted. One new species of *Trigonella* viz., *T. glabrata* allied to *T. corniculata* has been described and illustrated above Ralha of Himachal Pradesh.

19. **Balokhra, J.M. 1995.** *The Wonderland- Himachal Pradesh*. H.G. Publications, New Delhi.

20. **Bana, Anita & Singh, V. 2006.** "Taxonomic studies on Indian Caprifoliaceae–II: *Zabelia* (Rehder) Makino". *J. Econ. Taxon. Bot.* 30(4): 903–908.

Abstract: Taxonomic status and systematic position of the genus *Zabelia* (Rehder) Makino (Caprifoliaceae) are discussed. Only one species, viz., *Zabelia triflora* (R. Br. ex Wall.) Makino, is found in India (Jammu & Kashmir, Himachal Pradesh, Uttaranchal, Sikkim and West Bengal), which has been described in details with illustrations. Besides this, information about cytology, anatomy, phytochemistry, phenology, ecology, phytogeography etc have been provided.

21. **Banday, M., Bhardwaj, D.R., Pala, N.A. & Rajput, B.S. 2017.** "Quantitative analysis of woody vegetation in subtropical forests of Himachal Pradesh, India". *Indian Forester* 143(11): 1154–1159.

Abstract: The quantitative characteristic of woody vegetation was studied in five forest types of subtropical region viz., Bilaspur, Hamirpur, Solan and Sirmaur of Himachal Pradesh. A total of 41 species of woody vegetation including trees and shrubs were reported. Out of 41 species, 19 were trees belonging to 17 genera, 14 families and 22 species of shrubs belonging to 16 genera and 17 families. Tree density is recorded maximum in lower Shiwalik pine forest community (710N ha^{-1}) and minimum for Chir pine plantation community (370 N ha^{-1}). Shrub density is recorded maximum for northern mixed dry deciduous forest (12,320 N ha^{-1}) and the minimum for Himalayan chir pine forest community (4,133N ha^{-1}). Tree basal area ($m^{21}ha^{-1}$) was maximum for dry Shiwalik sal forest (46.42 m^2ha^{-1}). The minimum tree basal area was found in Chir pine plantation community (17.14 m^2ha^{-1}). Highest value of shrub basal area is observed for northern mixed dry deciduous forest community (11,94,502.94 cm^2ha^{-1}) and least for dry Shiwalik sal forest (13,944 cm^2ha^{-1}).

22. **Banerjee, U.K. 1993.** "Afforestation in cold Arid Zones of Himachal Pradesh problems and solutions". *Indian Forester* 119(11): 89–904.

Abstract: The paper deals with the problems of afforestation in the cold arid areas of Himachal Pradesh some work has been done previously to afforest these areas. But choice of wrong species along with poor moisture retaining capacity of the soil are the main reasons of failure. In order to afforest these areas choice of proper species and improvement in the irrigation technique will have to be kept in view.

23. **Barman, T., Jyoti, Anjana, Marpa, S., Lal, M., Singh, A., Sharma, P. & Samant, S.S. 2016.** "Diversity, distribution and status of orchids in Upper Beas catchment and Parbati valley of Kullu district, Himachal Pradesh". *J. Orchid Soc. India* 30(1-2): 57–64.

Abstract: The Indian Himalayan Region (IHR) is the most complex and diversified mountain ecosystem and occupies a special place in the world and covering an area about 5 lakh km^2, spreading on 10 states and hill regions of 2 states and 95 districts of the Indian subcontinent and contributes about 16.2% of the total geographical area of the country. The great variation in topogeographical features causes immense diversity in climate and habitat conditions within the region. Nestled and nurtured in the laps of the North-Western Himalaya, Kullu district is a veritable jewel in the crown of Himachal Pradesh, and is rich in floral and faunal diversity. It supports representative, natural, unique and socio-economically important biodiversity. The present study has been conducted in Upper Beas Catchment and Parbati Valley of Kullu District of Himachal Pradesh. During the exploration of floral diversity in the selected sites, the intensive survey and sampling of the orchids were also done with a view to study their diversity, distribution and status. Rapid sampling for the qualitative assessment and quadrat method for the quantitative assessment have been followed. Total 18 species representing 12 genera were recorded, of these, 12 species were recorded

from Upper Beas Catchment and 18 species were recorded from Parbati Valley. The species were analyzed for nativity, indigenous uses and threat categories. Amongst the species of both the valleys, 1 species was endemic and 2 species were near endemic; 15 native and 3 species were non-natives to the Indian Himalayan Region. Out of the total 18 species recorded, 12 species were found in the sampled sites for quantitative assessment. In Upper Beas Catchment, density of the species varied (*Calanthe tricarinata 0.25*-0.80 Ind m^{-2}, *Cephalanthera longifolia* 0.05 Ind m^{-2}, *Dactylorhiza hatagirea* 0.06-0.40 Ind m^{-2}, *Epipactis helleborine* 0.44 Ind m^{-2}, *Goodyera fusca* 0.07 Ind m^{-2}, *G. repens* 0.24 Ind m^{-2}, *Habenaria edgeworthii* 0.30-0.45 Ind m^{-2}, *H. pectinata* 0.01 Ind m^{-2}, *Herminium lanceum* 0.50-0.75 Ind m^{-2}, *H. monorchis* 0.35 Ind m^{-2}, *Malaxis acuminata* 0.01 Ind m^{-2}, and *Malaxis muscifera* 0.06-0.65 Ind m^{-2}). In Parbati valley, density of the species also varied *(Calanthe tricarinata* 0.55-0.80 Ind m^{-2}, *Cephalanthera longifolia* 0.05 Ind m^{-2}, *Cypripedium cordigerum* 0.05-0.88 Ind m^{-2}. C. *himalaicum* 0.11 Ind m^{-2}, *Dactylorhiza hatagirea 0.05*-0.15 Ind m^{-2}, *Epipactis helleborine* 0.09-0.77 Ind m^{-2}. *Galeola lindleyana* ranged from 0.10-0.33 Ind m^{-2}, *Goodyera fusca 0.23* Ind m^{-2}, *G. repens* 0.19 Ind m^{-2}, *Habenaria edgeworthii* 0.25-0.55 Ind m^{-2}, *H. intermedia* 0.22-0.45 Ind m^{-2}, *H. pectinata 0.07*-0.35 Ind m^{-2}, *Herminium lanceum* 0.60-0.95 Ind m^{-2}, *H. monorchis* 0.20-0.55 Ind m^{-2}, *Malaxis acuminata* 0.06-0.50 Ind m^{-2}, *M. muscifera* 0.06-0.17 Ind m^{-2}, *Satyrium nepalense* 0.22 Ind m^{-2} and *Spiranthes sinensis* 0.18 Ind m^{-2}). In both valleys, 3 species were identified as critically endangered; 2 species were identified as endangered, 3 species were as vulnerable and rest were near threatened. Some of the species have medicinal properties and used in the treatment of obstructive pulmonary diseases, chronic gastroenterological disorder, paralysis, arthritis, syphilis, jaundice, hepatitis, cholera, piles, bone fractures, rheumatism, malaria, cervix and breast cancer, cuts and wounds, dermatological diseases, gynecological malfunctioning, tuberculosis, blood purification, diabetes and also as rejuvenating drugs. The unscientific exploitation of economically important orchids, habitat degradation and changing environmental conditions has led the population towards depletion. Monitoring of habitats and populations, promotion of propagation by conventional and *in vitro* methods, establishment in the *ex situ* and *in situ* conditions, awareness among the inhabitants and involvement of the local inhabitants in the conservation management have been suggested.

24. **Bawa, R. 1986.** *Structural and functional studies of three semi-grassland communities near Shimla*. Ph.D. Thesis, Himachal Pradesh University, Summer Hill, Shimla (H.P.) (Unpublished).

25. **Bawa, R., Singh, V. & Sankhyan, H.P. 2011.** "Floristic diversity and phenology of woody elements in Dodra Kawar forest range of Himachal Pradesh". *J. Non-Timber Forest. Prod.* 18(3): 181–186.

Abstract: In the mountainous region marked variation in the site factors and vegetation occur due to change in aspect, which has considerable influence on the altitudinal distribution and growth of the species present. However, phenology is generally described as an art of observing the phases of the life cycle or the activities of the organism as they occurred through the year. These studies permit a calendar to be constructed for the vegetative activity of the plants especially the periods of leaf shading, flowering and fruiting superimposed on civil calendar. The present study deals with the floristic diversity and phonological behaviour of the woody elements in Dodra Kawar forest range of Himachal Pradesh.

26. **Bawa, R., Singh, V. & Sankhyan, H.P. 2013.** "Structural studies of woody elements in Dodra Kawar forest range of Himachal Pradesh". *Ann. Forest.* 21(2): 197–204.

Abstract: The ecological changes and diversity (natural vegetation) at any place in the Himalayas is determined by the interactions of vertical, traverse and longitudinal axis. The impact of terrain, diversity and altitudinal variation with concurrent changes in temperature and precipitation has created unique ecosystems of diverse habitats and species associations, one of the richest in the world. The present study on the structural parameters of the woody elements (trees and shrubs) in Dodra Kawar forest range in Himachal Pradesh depicted that the maximum number of species possessed an increasing or decreasing diversity values in different altitudinal zones. The similarity index between different areas and longitudinal zones with the dominating, codominating and associated species has been discussed.

27. **Bawa, R., Sankhyan, H.P. & Negi, H.S. 2009.** "Structural parameters of woody elements in Sangla valley of Kinnaur, Himachal Pradesh". *Indian J. Forest.* 32(3): 505–509.

Abstract: The present investigation was undertaken to study the structural parameters of woody elements in Sangla valley of district Kinnaur, Himachal Pradesh. Dominant, co-dominant and associated species in each transect (12) were worked out in accordance to their IVI values. Study concluded that the occurrence of overall dominating species were *Cedrus deodara,* with *Betula utilis* as the co-dominating and *Juniperus recurva* as the associated species. The study is helpful in developing a strong database for estimating the present status of woody element diversity.

28. **Bhardwaj, Arvind, Verma, R.K., Rana, J.C., Thakur, Kranti & Verma, Jagdeep. 2014.** "Orchid diversity at Chail Wildlife Sanctuary, Himachal Pradesh, Northwest Himalaya". *J. Orchid Soc. India* 28: 67–74.

Abstract: Present communication deals with orchid diversity at Chail Wildlife Sanctuary of Himachal Pradesh, Northwest Himalaya. Field surveys (2011–2013) revealed that the occurrence of 13 terrestrial orchid species under nine genera within the

geographical limits of the sanctuary. Majority of these species were found to occupy moist and shady forest floors and produced flowers during the months of July and August. Some of them (*Crepidium acuminatum, Habenaria intermedia, Malaxis muscifera, Satyrium nepalense*) are vulnerable herbs, which are used in various rejuvenating preparations. All of the species are taxonomically enumerated and notes are provided on their gross habitat characteristics and general distribution.

29. **Bhardwaj, S.D. & Kumar, D. 1993.** "Effect of sowing time on germination and growth of *Bauhinia variegata* L. and *Robinia pseudoacacia* L. under mid-hill conditions in Himachal Pradesh". *Indian J. Trop. Biodiv.* 1: 118–122.

Abstract: Seven sowing dates from March 10 to May 9 (at 10 days interval) were employed for sowing *Bauhinia variegata* and *Robinia pseudoacacia* seeds at Solan in Himachal Pradesh. In *B. variegata*, the maximum germination (88.7%), shoot length (72.86 cm) and biomass (26.88 g/plant) were observed following 30th March sowing, while shoot:root ratio (3.85) and collar diameter (0.65 cm) were maximum with 10th March and root length (25.46 cm) with 19th April sowing. In *R. pseudoacacia*, the highest germination (52.5%) was recorded for 19th April while the maximum shoot length (95.64 cm) and biomass (47.92 g/plant) for 20th March, root length (27.31 cm) and collar diameter (0.68 cm) for 10th March and shoot:root ratio (3.73) for 30th March sowing.

30. **Bhattacharyya, U.C. & Uniyal, B.P. 1982.** "A botanical tour to Pangi and Trilokinath in upper Chenab". *J. Bombay Nat. Hist. Soc.* 79(1): 57–78.

Abstract: The paper presents an account of exploration of a remote N.W. Himalayan valley along a pilgrimage route in the intersection of Lahul and Pangi valleys. Apart from highlighting its main features of vegetation, botanical wealth and physiography, the paper also enumerates a list of 235 species under 54 families, particularly collected in the upper Chenab, with short ecological notes including 62 species hitherto unreported from the Lahul valley.

31. **Biswas, A. & Ghosh, S.R. 1984.** "On the occurrence of *Woodwardia radicans* (L.) Smith in India and Nepal". *J. Econ. Taxon. Bot.* 5(2): 453–454.

Abstract: Controversy over the reported occurrence of *Woodwardia radicans* (L.) Smith is discussed in this paper and it is established that this taxon does not exist in India. Instead another species *Woodwardia unigemmata* (Makino) Nakai exists in India (Arunachal Pradesh, Himachal Pradesh, Sikkim & Uttar Pradesh) and Nepal.

32. **Buck, E.C. 1885.** "Twenty trees of Simla and neighbourhood". *J. Simla Nat. Soc.* 1: 27–143.

33. **Burkill, I.H. 1908.** "The spring flora of Simla hills". *J. & Proc. Asiat. Soc. Bengal* 4: 197–237.

34. **Chander, Hem, Kumari, Reena & Sharma, Shivani. 2018.** "Diversity, distribution and prioritization of fodder species for conservation in Hamirpur district, Himachal Pradesh". *CPUH Res. J.* 3(2): 124–131.

Abstract: The present study was conducted in rain fed district Hamirpur (Himachal Pradesh) to accumulate traditional knowledge regarding diversity and availability of fodder for livestock. Livestock is one of the main sources of livelihood and integral part of the economy to the local populace of the area. Livestock owners mostly rely on wild plants and cultivated crops for fodder. Livestock provides rural transport, manure, fuel, milk and meat. Most often, livestock is the only source of cash income for subsistence farming and also serves as insurance in the event of crop failure. Fodder is extracted from forests, grassland, agriculture and agroforestry. Fodder collected from the forest forms the largest component of biomass energy, which plays a significant role in improving the nutritional requirement of livestock. Unavailability of green forage during summer and winter has always remained a serious issues resulting into nutritional deficiency in milch animals. During the rainy season, the availability of fodder is in plenty, but there is fodder crisis in other seasons of the year as people are not aware of scientific conservation of grasses for lean periods. The shortage of green fodder has been estimated to be 30-35% in lean period. The diversity, distribution, utilization pattern, seasonality of availability, nutritive value and pressure use index of livestock has not been studied in the study area. The diversity, distribution and utilization pattern of fodder species is important for prioritization of fodder species for conservation and management of fodder species. During the present study, a total of eighty six fodder species has been documented which include trees (26 species), shrubs (27 species) and herbs (33 species). There are 34 families including Meliaceae (1 species), Poaceae (18 species), Caesalpinaceae (1 species), Fabaceae (9 species), Mimosaceae(4 species), Papilionaceae (1 species), Brassicaceae (6 species), Rosaceae (3 species), Chenopodiaceae (4 species), Rhamnaceae (1 species), Apocyanaceae (2 species), Acanthaceae (1 species), Papaveraceae (3 species), Moraceae (5 species), Tiliaceae (1 species), Linaceae (1 species), Menispermaceae (3 species), Fagaceae(2 species), Cucurbitaceae (1 species), Saliaceae(1 species), Sapindaceae (1 species), Rutaceae (1 species), Aceraceae (1 species), Amaranthaceae (2 species), Anacardiaceae (1 species), Asteraceae (1 species), Berberidaceae (1 species), Bignoniaceae (4 species), Boraginaceae (1 species), Commelinaceae (1 species), Cayperceae (1 species), Myrtaceae (1 species), Ranunculaceae (2 species) and Ulmaceae (1 species). Majority of fodder species are used as multipurpose and contributed to the high economic values. Eight species viz. *Grewia oppositifolia, Acacia catechu, Broussonetia papyrifera, Setaria viridis, Pistacia integerrima, Dendrocalamus hamiltonii, Morus alba* and *Paspalum scrobiculatum* showed

highest Pressure use index (PUI) indicating high preference and pressure. These eight species are being prioritized for conservation and management.

35. **Chandrasekar, K. & Srivastava, S.K. 2009.** *Flora of Pin Valley National Park, Himachal Pradesh*. Botanical Survey of India, Kolkata.

Abstract: The Flora includes taxonomic descriptions of 513 taxa belonging to 243 genera under 64 families of pteridophytes, gymnosperms and angiosperms with identification keys wherever necessary with a note on phenology habitat exsiccate distribution and uses and is supported by 31 line drawings and 155 colour photographs. Out of 513 taxa recorded from the Park 505 taxa are angiosperms 3 gymnosperms and Five pteridophytes.

36. **Chandrasekar, K. & Srivastava, S.K. 2010.** "A supplement to the flora of Lahaul-Spiti". *J. Non-Timber Forest Prod.* 17(2): 233–258.

Abstract: The paper deals with 115 taxa of angiosperms belonging to 24 families, 76 genera, as supplement to the flora of Lahaul-Spiti, Himachal Pradesh.

37. **Chandrasekar, K., Pandey, A., Srivastava, S.K. & Giri, L. 2015.** "Invasive alien plants of Himachal Pradesh, India". *Indian Forester* 141(5): 520–527.

Abstract: The present paper deals with the invasive alien plants found in the state of Himachal Pradesh, India. A total number of 125 invasive alien species under 83 genera, belonging to 39 families have been recorded based on field observations, herbarium and literature consultation. Tropical American elements contribute 75% of alien species found in the state. Among the invasive, annuals comprise 63%, herbs constitute 79% and only four tree species recorded as invasive species. Invasive species based habitat shows that 44% of invasive species were most abundant in wasteland, while cultivated fields, roadsides and forests were preferred by 20, 16 and 9% species respectively. Among the invasive alien elements, 70 species (56%) are being used by local inhabitants for different medicinal uses. Early detection and monitoring of naturalized weeds are essential for better control.

38. **Chandrasekhar, M.B., Singh, S. & Roy, P.S. 2003.** "Geo-spatial modelling techniques for rapid assessment of phytodiversity at landscape level in western Himalayas, Himachal Pradesh". *Curr. Sci.* 84: 663–670.

39. **Chauhan, K.C. & Hasolli, R. 2004.** "Nursery evaluation of promising species/varieties of *Leucaena* for fast growth under mid-hill conditions of Himachal Pradesh". *Indian Forester* 130(11): 1250–1258.

Abstract: Forty nine species/varieties of *Leucaena* were procured from different sources within and outside the country with an objective to screen the best species/ varieties under nursery condition for the suitability under mid-hill conditions of Himachal Pradesh. The analysis of variance revealed highly significant differences among

different species/varieties for seedling growth and biomass traits. After five months nursery growth T_{38} (*Leucaena esculenta* × *esculenta*, ID-47/87) and T_{37} (*L. esculenta* × *paniculata*, ID-79/92) excelled for growth and biomass traits than others, whereas, T_1 (*L. pulverulenta* × *L. leucocephala*-K75) depicted the least values for collar diameter, inter nodal length, leaf area, root fresh and dry weight, T_{44} (*L. multicapitulata*, ID-81/87) for seedling height and number of nodes, T_4 (*L. pulverulenta*, ID- 84/87) and T_{21} (*L. diversifolia*, ID-45/87) for shoot fresh and dry weight.

40. **Chauhan, N.S. 2001.** "Plant genetic resources of Spiti– A cold desert in the Western Himalayas". *Indian J. Pl. Genet. Resour.* 14: 265–268.

41. **Chauhan, R.C. 1987.** *Hydrobiological studies of Renuka and Rewalsar lakes of Himachal Pradesh with special emphasis on productivity*. Ph. D. Thesis, Himachal Pradesh University, Summer Hill, Shimla (H.P.) (Unpublished).

42. **Chauhan, S.K., Sharma, P.K. & Moorti, T.V. 1992.** "Studies on wooing wastelands for environmental protection and economical biomass productivity with bamboos (*Dendrocalamus hamiltonii*) in Western Himalayas– Some projections". *Indian J. Forest.* 15(2): 121–130.

Abstract: In a case study conducted in district Kangra of Himachal Pradesh in Western Himalayas pertaining to socio-economic aspects and extent of wastelands, it was found that the average operational holding was 1.279 ha. The extent of wastelands per farm was found to be inversely related to altitude exhibiting their greater interaction with human beings and animals. The total area under wastelands, on an average, was found to be 20 ha per village, out of which around 40 per cent belonged to land capability classes IV, 21 per cent fell in class III. However, the lands that belonged to category VI were 20 per cent and those in class VII were around 4 per cent. The dependence of people on fuel-wood was quite heavy and was directly proportional to altitude. Besides the shortage of fuel-wood, fodder and timber, the environmental degradation in terms of floods in monsoon, and repeated droughts in summer emanating from disrupted hydrological cycle, was also noticed around such lands. In order to bring these lands back to health in terms of producing fodder, fuel-wood and timber besides restoring environmental protection, their rehabilitation with bamboos plantation has been suggested and projections have been made that following this biomass system on the wastelands, a net profit of Rs. 33,776 per ha with benefit-cost ratio of 13.75 could be attained.

43. **Chauhan, V.K., Rana, R.S., Joshi, A.K. & Dholta, V. 2010.** "Study of plant diversity in Kandi region of Himachal Pradesh". *Indian Forester* 136(2): 173–181.

Abstract: Plant diversity in Kandi region of Himachal Pradesh was studied during the year 2006–2008. Quantitative documentation of plant diversity is important for *in-situ* conservation and deriving diversified uses of valuable flora on a sustainable

basis. In the present study, 24 species of fiber and forage grasses, 14 of fodder legumes, 22 shrubs of medicinal value, 20 of diversified fruit and 30 of valuable agro-forestry trees have been reported. The investigation is of special significance and could help to assess the loss of plant diversity over a long period.

44. **Chaurasia, O.P., Singh, Brahma & Ballabh, Basant. 2001.** "Potential aromatic flora of Himalayan Cold Desert: Ladakh and Lahul-Spiti". *J. Econ. Taxon. Bot.* 25(1): 91–97.

Abstract: The aromatic plants and aroma chemicals (essential oils) play a vital role directly as well as indirectly in the day to day life of man since its appearance on the earth. Now a days, these oils have been extensively used as perfumes and perfume products in pharmaceutical areas and flavouring foods. Keeping in view, the present paper is an attempt to enlist, improvement, conservation, multiplication and popularization of aromatic plant species of Ladakh and Lahul-Spiti. A total of 39 aromatic plant species were collected from far-flung areas and higher passes of Ladakh and Lahul-Spiti along with their various local uses. A detailed integrated approach is required for commercial exploitation of potential aromatic plant species of Ladakh and Lahul-Spiti.

45. **Chawla, A., Kumar, A., Lal, B., Singh, R.D. & Thukral, A.K. 2011.** "Ecological characterization of high altitude Himalayan landscapes in the upper Satluj river watershed in Kinnaur, Himachal Pradesh, India". *J. Indian Soc. Remote Sensing* 40(3): 519–539.

Abstract: The Indian Remote Sensing (IRS) LISS III satellite imagery was used to classify three landscapes in the upper Satluj river watershed in Kinnaur region of western Himalaya *viz*. Nichar, Kalpa and Pooh. These landscapes representing different eco-climatic zones were subjected to landscape ecological analysis and various landscape composition, patch and edge characteristic metrics were computed to find the extent of fragmentation in the natural vegetation. The natural vegetation comprised of forests (10.24%), grasslands (31.04%) and scrublands (2.95%) as the landscape elements (LSE). These LSEs were further segregated into different LSE types based on the dominant species of plant communities in the landscapes. These LSE types were surveyed for species diversity in the three landscapes. The total landscape area (TLA) covered by natural vegetation in Nichar, Kalpa and Pooh landscapes was calculated to be 651.42, 529.02 and 1,673.72 km^2 making the total area covered with natural vegetation in the district as 2,854.16 km^2. The Pooh block, lying in the east of the district, though covered the largest area of the landscape, was poor in terms of landscape composition as compared to the Nichar block which was rich in landscape elements as suggested by the diversity measures. The extent of fragmentation was found to be highest in Nichar. The Nichar landscape was observed to be having higher mean values of species diversity than other blocks which is

consistent with the trends observed with patches diversity. This was in contrast to the Pooh landscape where the patch diversity as well as the species diversity was the lowest. Thus, an ecological analysis utilizing landscape metrics and biodiversity field sampling of vegetation, was attempted for such heterogenous landscapes in high altitudes of Himalaya, which provided a baseline data for the management and conservation of these virgin mountainous areas.

46. **Chawla, A., Rajkumar, S., Singh, K.N., Lal, B. & Singh, R.D. 2008.** "Plant species diversity along an altitudinal gradient of Bhabha valley in Western Himalaya". *J. Mountain Sci. 5*: 157–177.

Abstract: The present study highlights the rich species diversity of higher plants in the Bhabha Valley of western Himalaya in India. The analysis of species diversity revealed that a total of 313 species of higher plants inhabit the valley with a characteristic of moist alpine shrub vegetation. The herbaceous life forms dominate and increase with increasing altitude. The major representations are from the families Asteraceae, Rosaceae, Lamiaceae and Poaceae, suggesting thereby the alpine meadow nature of the study area. The effect of altitude on species diversity displays a hump-shaped curve which may be attributed to increase in habitat diversity at the median ranges and relatively less habitat diversity at higher altitudes. The anthropogenic pressure at lower altitudes results in low plant diversity towards the bottom of the valley with most of the species being exotic in nature. Though the plant diversity is less at higher altitudinal ranges, the uniqueness is relatively high with high species replacement rates. More than 90% of variability in the species diversity could be explained using appropriate quantitative and statistical analysis along the altitudinal gradient. The valley harbours 18 threatened and 41 endemic species, most of which occur at higher altitudinal gradients due to habitat specificity.

47. **Chawla, A., Prakash, O., Sharma, V., Rajkumar, S., Lal, B., Gopichand, Singh, R.D. & Thukral, A.K. 2012.** "Vascular plants, Kinnaur, Himachal Pradesh, India". *Check List* 8(3): 321–348.

Abstract: In the present study, we provide a checklist of the vascular plants of Kinnaur district situated in the Himachal Pradesh state of India in the western Himalaya. This checklist includes 893 taxa (viz., species, subspecies and varieties) belonging to 881 species of angiosperms and gymnosperms distributed among 102 families and 433 genera, and 30 species of pteridophytes. Information about the growth habit, threat and endemicity status is also provided. Our results show that family Compositae is by far the most species rich family with 122 species, followed by Poaceae (69), Rosaceae (58), Leguminosae (49) and Lamiaceae (38). Among the genera, *Artemisia* is the most diverse genus with 19 species, followed by *Potentilla* (14), *Saussurea* (13), *Polygonum* (11), *Astragalus* (10), *Lonicera* (10) and *Nepeta* (10). Similar to other regions in the

western Himalayan range, family-to-genera ratio was 1:4.25 and the genera-to-species ratio was 1:2.04. Out of 893 taxa, our checklist includes 606 herb species, 63 trees, 108 shrubs, 28 climbers, 67 graminoids and 21 sedges and rushes. Of all the species recorded, 108 (12.2%) are endemic to western Himalaya and 27 (3%) are placed under IUCN threatened categories. The present checklist on the flora of Kinnaur provides an important baseline data for further quantitative studies on the characteristics of plant communities in this region and will help in the identification of priority conservation areas.

48. **Chib, S.S. 1977.** *This beautiful India. Himachal Pradesh*. Light and Life Publishers, New Delhi.

49. **Chowdhery, H.J. 1997.** Himachal Pradesh. In: Mudgal, V. & Hajra, P.K. (Eds.), *Floristic Diversity and Conservation Strategies in India*. Vol. II: 845–904. Botanical Survey of India, Calcutta.

50. **Chowdhery, H.J. & Rao, R.R. 1990.** "Plant life in the Himalayan Cold Desert: Some adaptive strategies". *Bull. Bot. Surv. India* 32(1-4): 43–96.

51. **Chowdhery, H.J. & Wadhwa, B.M. 1984.** *Flora of Himachal Pradesh: Analysis*. Vols. 1-3. Botanical Survey of India, Howrah.

Abstract: 1202 species of flowering plants belonging to 85 families (Ranunculaceae to Caprifoliaceae) has been reported in Volume 1, 68 families from Rubiaceae to Salicaceae reported in Volume 2 and Volume 3 represents 27 families of Monoctyledons from Hydrocharitaceae to Bambusaceae.

52. **Collett, H. 1902**. *Flora Simlensis: A Handbook of the Flowering Plants of Simla and the neighbourhood*. Thacker Spink and Co., Calcutta and Simla. [Bishen Singh Mahendra Pal Singh, Dehra Dun. (Reprinted 1971)].

53. **Das, D.S., Rawat, D.S., Shrivastava, N., Ambrish, K., Sinha, B.P., Singh, P., & Dash, S.S. 2017.** "A contribution to the flora of Great Himalayan National Park, Himachal Pradesh, India". *Nelumbo* 59(1): 33–43.

Abstract: The present study deals with new addition to the flora of the Great Himalayan National Park (GHNP), located in Kullu district of Himachal Pradesh. A total of 39 unreported species under 26 families were recorded during the recent plant exploration from the Great Himalayan National Park. A brief description based on the field character, phenology, a note on distribution and ecology has been provided here for each species.

54. **Das, D.S., Rawat, D.S., Sinha, B.P., Singh, P., Maity, D. & Dash, S.S. 2018.** "Contribution to the flora of Great Himalayan National Park, Himachal Pradesh, Western Himalaya-II". *Nelumbo* 60(1): 26–37.

Abstract: This account of contribution is a sequel of additions to the flora of the Great Himalayan National Park (GHNP), Western Himalaya communicates additional 48 species of seed plants that are newly reported from the Park. All the species are enumerated alphabetically with brief description based on field character, phenology and local distribution pattern.

55. **De, Aparajita & Hajra, P.K. 2014.** "Orchid diversity of North Western Himalaya and its conservation". *J. Orchid Soc. India* 28: 1–13.

Abstract: North Western Himalayas comprises the states of Jammu & Kashmir, Himachal Praesh and Uttarakhand. The topography of NW Himalayan region is irregular and intercepted by valleys and plateaus of various extent and as such the stratification is not clear. There is a great diversity in the floristic pattern due to great altitudinal variation. The family Orchidaceae exhibit enormous diversity and is represented by *ca* 240 species. The paper highlights richness of the orchid diversity of the region and their conservation.

56. **Debta, M.R. & Srivastava, S.K. 2012.** "Notes on the occurrence of a few Himalayan species". *Indian J. Forest.* 35(3): 357–360.

Abstract: The present article deals with the report of four taxa, viz., *Agrostis inaequiglumis* Griseb., *Potentilla griffithii* Hook.f., *P. microphylla* D. Don and *Stellaria decumbens* var. *pulvinata* Edgew. & Hook.f. from Singalila National park, West Bengal as new additions to the state, whereas *Potentilla microphylla* D. Don and *Stellaria decumbens* var. *pulvinata* Edgew. & Hook.f. are new additions to Himachal Pradesh, along with the note on their distribution in Himalayan region. Brief description with taxonomic notes and exsiccate are also provided for each taxon.

57. **Debta, M.R. & Srivastava, S.K. 2017.** "An overview of plant diversity in Col. Sher Jung National Park, Sirmaur district, Himachal Pradesh". *Phytotaxonomy* 17: 27–30.

Abstract: The present paper reports the phytodiversity in Col. Sher Jung National Park, Sirmaur district, Himachal Pradesh. The park has a total of 303 taxa belonging to 244 genera under 80 families. Vegetation and existing threats to the flora are also discussed.

58. **Debta, M.R., Dogra, K.S., Bhakal, R.K. & Ambrish, K. 2019.** "Assessment of invasive alien species in Col. Sher Jung National Park, Sirmaur district, Himachal Pradesh". *Indian J. Forest.* 42(1): 39–42.

Abstract: The present paper is an attempt to document the data on invasive alien species occurring in Col. Sher Jung National Park, Sirmaur district, Himachal Pradesh along with their implications in conservation perspective. A total of 39 species belonging to 19 angiospermic families are enlisted as invasive alien species from this national park. The purpose of introduction of alien species also discussed along with their nativity.

59. **Devi, Kaushalya, Samant, S.S., Puri, Sunil & Dutt, Sunil. 2018.** "Diversity, distribution pattern and indigenous uses of orchids in Kanawar Wildlife Sanctuary of Himachal Pradesh, Northwestern Himalaya". *J. Orchid Soc. India* 32: 17–23.

Abstract: The present investigation was carried out for the exploration of orchids in Kanawar Wildlife Sanctuary of Himachal Pradesh, Northwestern Himalaya. Sixteen species of orchids representing nine genera were recorded. Amongst the species studied, 10 species were native to the Himalayan region and 2 were near endemic to the Indian Himalayan Region (IHR). Majority of these orchid species grow between 2501m–2800 m. Eight different habitats were identified and majority of the orchid species were reported in shady moist habitat. Most of the species were used for curing various diseases/ailments by the inhabitants of the valley. *Dactylorhiza hatagirea* and *Malaxis muscifera*, the high altitude species were identified as critically endangered. Due to high commercial values of *D. hatagirea* and *M. muscifera* as medicine and food, these species are facing high anthropogenic pressure, leading to their repid population depletion in the area. Therefore, regular monitoring of populations of orchids in relation to climate scenario has been suggested for understanding the dynamics of species and developing strategies for conservation.

60. **Devi, T. 2013.** *Floristic diversity for the socio-economic development of Rissa Khad watershed in Central Himachal Pradesh, North Western Himalaya*. Ph. D. Thesis, Kumaun University, Nainital (Unpublished).

61. **Devi, Usha, Sharma, Pankaj, Rana, J.C. & Sharma, Aman. 2014.** "Phytodiversity assessment in Sangla valley, northwest Himalaya, India". *Check List* 10(4): 740–760.

Abstract: The present study was conducted to assess the phytodiversity of vascular plants in Sangla valley of Himachal Pradesh, India. We recorded 639 species of vascular plants belonging to 321 genera and 99 families, in which angiosperms comprised 80 families, 296 genera and 584 species; gymnosperms 5 families, 8 genera and 14 species, and pteridophytes 14 families, 17 genera and 41 species. Angiosperms were mainly represented by families such as Compositae (91 spp.), Poaceae (38 spp.), Rosaceae (32 spp.), Lamiaceae (30 spp.), Apiaceae (24 spp.), Ranunculaceae (23 spp.), Brassicaceae (21 spp.), Polygonaceace (20 spp.) and Caryophylaceae (16 spp.). *Artemisia* and *Polygonum* were most species rich genera with 11 spp. each followed by *Nepeta* (9), *Pedicularis* (8), *Anaphalis, Impatiens, Poa* and *Potentilla*, (7 each), *Berberis, Erigeron* and *Gentiana* (6 each). The trees were 28, shrubs (62) herbs (488) and climbers (6). Among Gymnosperms, Pinaceae was dominant with 7 species followed by Cupressaceae (4 spp.) while major genera were Juniperus (4 spp.) and Pinus (3 spp.). These were represented by 10 trees and 4 shrubs. Dominant families of Pteridophytes were Dryopteridaceae (9 spp.), Aspleniaceae (6 spp.) and Athyriaceae (5 spp.). Major genera were *Asplenium* (6 spp.), *Polystichum* (5 spp.) and *Dryopteris*

(4 spp.). A total of 316 species were native; 69 endemic and 170 were near endemic to the Indian Himalaya. 5 species were found to be critically endangered, 12 endangered and 16 were vulnerable in the valley.

62. **Dhaliwal, D.S. & Sharma, M. 1997**. Phytogeographic comments on the Flora of Kullu District. In: Shar, T.A., Saini, S.S., Trivedi, M.L. & Sharma, M. (Eds.), *Current Researches in Plant Sciences*. Bishen Singh Mahendra Pal Singh, Dehra Dun. Vol. 1: 169–175.

63. **Dhaliwal, D.S. & Sharma, M. 1999**. *Flora of Kullu District (Himachal Pradesh)*. Bishen Singh Mahendra Pal Singh, Dehra Dun.

64. **Dhaliwal, D.S. & Sharma, M. 1999**. Floristic analysis and diversity of Kullu district, Himachal Pradesh. In: Sivadasan, M. & Matthew, P. (Eds.), *Diversity, Taxonomy and Conservation of Flowering Plants*. Mentor Books, Calicut, India, Pp. 49–55.

65. **Dogra, K.S., Kohli, R.K. & Sood, S.K. 2009.** "An assessment and impact of three invasive species in the Shivalik hills of Himachal Pradesh, India". *Int. J. Biodiv. Conserv.* 1(1): 4–10.

Abstract: The Shivalik hills in Northwestern Himalayan range of India have a rich floral diversity. Unfortunately du-ring the last two decades there has been drastic reduction in the diversity of the natural vegetation. The available niches have been occupied by invasive exotic species that were either introduced or have en-tered accidently. It has resulted from a numbers of factors including increased inter and intracontinental links, import-export and climate change. These exotic species possess certain traits that provide them competitive advantage over the natives and thus aid in their fast spread in the alien environment. Even some of the plants introduced for beneficial purposes have acquired weedy habit. It has greatly altered the structure of the natural ecosystems and caused a dramatic shift in the diversity and dynamics of native flora. The situation has further aggravated due to lack of awareness, insufficient information on the species and its dimensions of the spread besides wide ecological amplitude. It was observed that the diversity, evenness and richness of the native species were drastically reduced in the forest invaded by the exotics.

66. **Dogra, K.S., Kohli, R.K., Sood, S.K. & Dobhal, P.K. 2009.** "Impact of *Ageratum conyzoides* L. the diversity and composition of vegetation in the Shivalik hills of Himachal (North-western Himalaya), India". *Int. J. Biodiv. Conserv.* 1(4): 135–145.

Abstract: The flora of the Shivalik hills of Himachal Pradesh, India is under threat due to the rapid invasion of invasive species. Invasive species means an alien species, which becomes established in natural or semi-natural ecosystems and threatens native biological diversity. In their new regimes they show diverse life forms, habit, morphology, reproductive biology, grow fast, have the ability to grow under different habitats, produce enormous number of very small, light weight seeds that

and can survive in soil for years helping long distance dispersal and spread. They can out-compete native species, reduce wildlife habitat potential, alter natural ecosystem processes and limit overall biodiversity. *Ageratum conyzoides* is one such widely adaptive weed from sub-tropical America that has entered in the Shivalik hills of Hamirpur district of Himachal Pradesh. It has grown as monocultures, in grasslands, forests, agricultural, plantations and horticultural fields in Himachal Pradesh. Hence, it was decided to evaluate the impact of *A. conyzoides* on the diversity and floristic compositions of native species. It was found that as compared to control, in the *Ageratum* invaded area; the average number of plant species has reduced by 32.10%; the á diversity has reduced by 41.21% and the dry biomass of plants has also reduced significantly. It was concluded that invasion of *A. conyzoides* is drastically affecting the productivity and diversity of the invaded areas in Shivalik hills of Hamirpur district.

67. **Dutta, B. & Sharma, Y.P. 2003.** "Screening of Chirata Plant (*Swertia chirayita*) from Himachal Pradesh for bitterness variability". *Bionotes* 5(2): 37–38.

68. **Flewett, W.E. 1930.** "A short account of the Kullu Forest Division". *Indian Forester* 56: 335–339.

69. **Gammie, G.A. 1898.** "A botanical tour in Chamba and Kangra". *Rec. Bot. Surv. India* 1: 183–214.

70. **Gammie, G.A. 1979.** *Botanical tour in Chamba and Kangra*. Periodical Expert Book Agency, Delhi.

71. **Garg, Arti & Husain, Tariq. 2009.** "Impact of microhabitat on different species of *Pedicularis* L. in Himachal Pradesh". *J. Econ. Taxon. Bot.* 33(4): 947–951.

Abstract: Microhabitat association in the hemi-parasitic Himalayan genus *Pedicularis* L. (Scrophulariaceae) is discussed for the species occurring in Himachal Pradesh. The species exhibited specific microhabitat association. Any alteration in the associated plant species of *Pedicularis*, which constitute its specific microhabitat brings about simultaneous disappearance of that particular *Pedicularis* species and emergence of another.

72. **Gupta, B. & Singh, R. 1991.** "Monthly variations in caloric contents of plants in grassland communities around Shimla, H.P.". *Indian J. Forest.* 14(4): 292–298.

Abstract: The study was done in two grassland sites, i.e. Site- I- Ungrazed and Site – II- Grazed near Shimla town from June 1983 to May 1985. Among the four plant categories legumes and non-legumes showed higher calorific values as compared to grasses and sedges. The energy content in aboveground (live) and below ground biomass compartments at the two sites varied between 3380 cal/g to 4932 cal/g and 3035 cal/g to 4878 cal/g, respectively. Standing dead and litter compartments

showed lower calorific values. Seasonally, the calorific values in aboveground (live) biomass were higher in rany season, while in belowground biomass, standing dead and litter higher values were recorded in winter season. Standing crop of energy in aboveground (live) biomass was higher in rainy season, while it achieved higher values in other plant compartments in winter and/or summer season. Energy content in aboveground biomass was higher at ungrazed site as compared to grazed site. Environmental variables were found to affect calorific content and standing crop of energy in different plant categories/compartments significantly.

73. **Gupta, N.K. 1996.** *Appraisal of vegetation pattern of Shimla district through remote sensing with special reference to the ecology of fir-spruce forest.* Ph. D. Thesis, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh (Unpublished).

74. **Gupta, R. 1961.** "Flora of Lam Dal". *Indian Forester* 87(5): 316–324.

Abstract: The alpinic flora of Lam Dal lakes in the Chamba district of Himachal Pradesh has been described and species hitherto missing in the floras covering the area have been listed. In total 121 species of plants belonging to 28 families and 82 genera of flowering plants have been listed in this paper. Out of this number 32 are those which are not given in Collett's 'Flora Simlensis' and are marked with an asterisk while 30 are reputed locally as medicinal plants and are marked with double asterisk.

75. **Gupta, R. 1965.** "Introduction of *Hops* cultivation in Himachal Pradesh". *Indian Perfumer* 9: 81–85.

76. **Gupta, R. 1967.** "Cultivation of *Digitalis lanata* Ehrh. in Chamba Hills, Himachal Pradesh". *Indian Forester* 93: 33–40.

Abstract: The natural glycoside- *Lanatoside* C and its de-acetyl derivative *Digoxin*, obtained from leaves of *Digitalis lanata* Ehrh, are most efficacious cardio-tonic drugs that find increasing use in modern cardio-therapy. The plant, though introduced in the country long back is nowhere grown on commercial scale and hence India's requirements of the glycoside continues to be imported in toto. The author has carried out experiments for four consecutive years on different aspects of its farming in Chamba district of Himachal Pradesh; the leaves so produced are found acceptable to pharmaceutical industry. Cutural details for commercial cultivation of this species in India are presented.

77. **Hanief, S.M., Thakur, S.D., Wani, A.M. & Malik, A.R. 2008.** "Vegetal profile of naturally revegetated and artificially reclaimed limestone mines in *Quercus leucotrichophora* forests of Himachal Pradesh, India". *Ann. Forest.* 16(1): 33–41.

Abstract: Post mining and pre-mining forest vegetation was studied in the limestone mined area of *Quercus* forest in the Sirmaur district of Himachal Pradesh. An attempt

was made to ascertain the extent to which vegetation has been re-established on abandoned and artificially vegetated limestone in comparison to unmined area. Sample quadrates were laid in each area studied. Succession appears to be progressing very slowly in the abandoned site. Centuries will be needed for the forest to re-establish naturally. If however, the mined sites are artificially modified and suitable species are planted, it will take less time to re-establish the forests. The vegetation developed on such site will be altogether different from the vegetation naturally occurring in the area.

78. **Hegde, G.T., Murthy, I.K., Bhat, P.R., Swarnim, S., Alipuria, A.K. & Ravindranath, N.H. 2011.** "Vegetation status in degraded forest, community and private lands of Himachal Pradesh". *Indian Forester* 137(5): 544–555.

Abstract: Current vegetation status including the diversity, the biomass and carbon stocks of three land categories viz., degraded forestlands, degraded community lands and degraded private lands across three altitudinal zones of Himachal Pradesh is presented in this paper. Restoration of the degraded lands requires concentrated efforts to formulate management strategies that would help meet the fuelwood and fodder requirements of the communities residing close to these lands and at the time promote tree diversity. An assessment of the status of degraded land categories are needed to identify hot spots and problem areas and coupled with such assessments there is also a need for socio-economic studies that try to understand the linkages between communities residing close to these degraded lands, their dependence and needs. Capitalizing on natural recovery mechanisms is urgently needed to prevent further irreversible degradation and to retain the multiple values of productive land.

79. **Hope, C.W. 1921.** Ferns of Simla. In: H. Collet's, *Flora Sinlensis*. Thacker Spink & Co., Calcutta and Simla (2nd Edition).

80. **Husain, Tariq & Agnihotri, Priyanka. 2008.** "*Pedicularis cheilanthifolia* Schrank (Scrophulariaceae) complex in the Indian Himalayas". *Phytotaxonomy* 8: 62–64.

Abstract: The taxonomic complexity of *Pedicularis cheilanthifolia* Schrank. along with three varieties, viz. var. *cheilanthifolia,* var. *purpurea* (Pennell) Tsoong ex Husain & Agnihotri and var. *albida* (Pennell) Tsoong has been highlighted and solved. Morphological, distributional, phonological and ecological data have been appended to show that the varieties are distinct. The species *P. purpurea* is transferred under *P. cheilanthifolia* on the basis of morphological characters.

81. **Jain, S.K. & Bharadwaja, R.C. 1949.** "On a botanical trip to the Parvatti valley". *Indian Forester 75*(8): 302–315.

Abstract: A total 245 species belonging to 189 genera under 82 families has been recorded from this area. Within this 245 species, 48 species which are not mentioned in the Collett's Flora Simlensis.

82. **Jaryan, V., Uniyal, S.K., Gupta, R.C. & Singh, R.D. 2013.** "Alien flora of Indian Himalayan state of Himachal Pradesh". *Environm. Monit. Assessm.* 185: 6129–6153.

Abstract: Recognizing the array of effects that invasive alien species have, documenting their status from biodiversity rich regions has been much emphasized. Lack of such studies is a major limitation that hampers proper management of alien species. The present paper, therefore, documents the alien flora of the Indian Himalayan state of Himachal Pradesh (HP) based on data obtained from literature and herbarium records. The alien flora of HP comprises of 497 species belonging to 85 families. Majority of them belong to family Asteraceae (59 species), followed by Poaceae (47 species) and Fabaceae (43 species). Amongst the genera, *Ipomoea* (9 species), *Eucalyptus* and *Euphorbia* (7 species each) are the most predominant. Herbs constitute the majority (i.e., 73 %) of alien species and a large percentage of them (i.e., 22.94 %) have South America as their native region. Further, of the total alien species, 248 are intentional introductions and majority (31% species) have been introduced for ornamental purposes. It was revealed that 34 % species have naturalized while 29 % species have become invasive. Today, in addition to human-disturbed landscapes, alien species have also been reported from dense forests. Himalaya being a biodiversity hotspot and HP being a bio-rich Himalayan state, it is hoped that this inventory and assessment of alien flora will help in designing informed management and monitoring strategies against problematic plant invasions in the state.

83. **Jishtu, V. & Rawat, R.S. 2014.** "*Juniperus polycarpos* C. Koch forests and its conservation status in Cold Deserts of Himachal Pradesh, North West Himalayas". *Indian Forester* 140(4): 378–383.

Abstract: The article outlines the results of a study carried out for assessing the distribution and ecological status of *Juniperus polycarpos* C. Koch in cold deserts of Himachal Pradesh, comprising the districts of Lahaul and Spiti and Pooh Subdivision of Kinnaur district. A valley-wise inventory of the cold deserts under the species had been prepared and compared with the available records. Regeneration status and vegetative associates of the species in various valleys of the cold deserts have also been recorded. The results of study show that the species is under great threat due to the ever-increasing biotic pressure and poor natural regeneration. The article also suggested some measures to be initiated for its conservation.

84. **Jishtu, V., Goraya, G.S. & Rawat, G.S. 2007.** "Flora of Rupi-Bhaba Wildlife Sanctuary: A checklist". *J. Econ. Taxon. Bot.* 31(4): 953–974.

Abstract: Survey of flora of Rupi-Bhaba Wildlife Sanctuary revealed the occurrence of 635 species belonging to 247 genera under 103 families. The flora has been classified as angiosperms and gymnosperms and the families are arranged as per

Bentham and Hooker (1862-1883) system of classification. Further, the genera under a family and species thereafter follow an alphabetic sequence. For each species, correct botanical name with author citation and vernacular name, if any, have been cited, besides habit, distributional altitudinal range and local uses.

85. **Joshi, A.C. 1952.** "Aquatic vegetation of Lahaul". *The Palaeobotanist* 1: 277–280.

86. **Kairon, V., Sankhyan, H.P. & Singh, N.B. 2016.** "Evaluation of *Sapindus mukorossi* population in Himachal Pradesh". *Indian Forester* 142(7): 670–674.

Abstract: Twenty four populations of *Sapindus mukorossi* Gaertn. scattered over a wide range upto 1500 m elevation in Himachal Pradesh were evaluated to observe variation in seed oil contents and seed oil quality traits. Significant variation among different populations were observed for per cent seed oil content and non significant for oil quality traits. Maximum oil content was recorded in Garsa (18.92%) population. D.B.H classes did not show distinct variation for seed oil content and oil quality traits. Study concluded that on an average, the populations of Garsa (Kullu Forest Division) of Himachal Pradesh was found to be best over all other populations for both the traits. This investigation will be useful for further improvement of the species for improved genetic gain.

87. **Kairon, V.K., Sankhyan, H.P., Thakur, S., Sharma, S.S. & Rana, N. 2016.** "Morphological evaluation of Seabuckthorn (*Hippophae rhamnoides* L.) population under different major gene pool areas of Spiti valley of Himachal Pradesh". *Indian J. Forest.* 39(4): 317–320.

Abstract: Morphological evaluation in Seabuckthorn (*Hippophae rhamnoides* L.) was carried out among nine major gene pool areas and three growing conditions, within each major gene pool area of Spiti valley of Himachal Pradesh. The performance of most morphological traits showed significant variations among different major gene pool areas as well as within different growing conditions. GPA-4 *Schilling) was superior than other major gene pool areas for plant and leaf morphological traits and GPA-3 (Sheigo) for fruits parameters among different major gene pool areas. Overall, GC-3 (crop land) was found superior for all morphological traits among different growing conditions and in different major gene pool areas. It emerged from the present study that a large variability exists in the population of *Hippophae rhamnoides* growing under different growing conditions among different major gene pool areas in Spiti valley of Himachal Pradesh, particularly for morphological traits, which can be harnessed for improved genetic gain. The variability of different characters could be utilized for selection of genotype suitable for the plantation and utilization in making different non wood forests products and also for utilizing ecological and economical gains in cold desert of Himachal Pradesh.

88. **Kala, C.P. & Dubey, Y. 2009.** "Vegetation distribution and impact of livestock grazing in the Kothi watershed of Kullu district in Himachal Pradesh, India". *Ann. Forest.* 17(2): 243–250.

Abstract: A study was undertaken in the Kothi watershed of Himachal Pradesh with a view to understand the patterns in vegetation distribution and impact of livestock grazing in the mountain ecosystems of the Higher Himalaya. The study results in the documentation of 243 species of vascular plants distributed over 57 families and 160 genera. The study area sustained a number of rare and threatened plant species of which 13 species are known for having medicinal properties. The effect of livestock grazing was species specific and acknowledge intermediate disturbance hypothesis. The results of this study are discussed in terms of species distribution and effect of livestock grazing for dealing with management of high altitude mountain ecosystem and environment.

89. **Kapahi, B.K. & Sarin, Y.K. 1979.** "Contribution to the botany of Lahul". *J. Bombay Nat. Hist. Soc.* 74(Suppl.): 627–639.

Abstract: 275 species belonging to 152 genera and 46 families of angiosperms and gymnosperms has been reported from this area.

90. **Kapahi, B.K. & Srivastava, T.N. 1995.** "Collection of phanerogamic elements along Lahaul (H.P.) to Ladakh (J&K)". *J. Econ. Taxon. Bot.* 19(1): 133–140.

Abstract: An expedition from Lahaul (H.P.) to Ladakh (J&K) was made in view to collect phanerogamic elements of high altitude. During the expedition 329 species belonging to 182 genera and 48 families have been collected.

91. **Kapoor, K.S. & Singh, R. 1991.** "Standing crop and variety ration of temperature grasslands with varying biotic pressure in Shimla Hills: An analysis". *J. Trop. Forest.* 7(2): 109–114.

92. **Kapoor, K.S., Subramani, S.P. & Rawat, R.S. 2005.** "Some lesser known tree species of Himachal Pradesh". *Environm. & Ecol.* 23(2): 288–296.

93. **Kapoor, K.S., Verma, R.K., Rawat, R.S., Subramani, S.P. & Jishtu, V. 2003.** "Impact of plantations raised in surface mined areas on floral diversity and soil properties". *Indian J. Forest.* 26(2): 195–200.

Abstract: Changes as brought about in diversity of floral species and in chemical properties of soil under pure plantations of *Robinia pseudoacacia* and mixed plantation raised over the mine overburden areas of Paonta Sahib in Sirmour district of Himachal Pradesh were studied during August 2000. The number of ground flora species under *Robinia pseudoacacia* and mixed plantation was 25 m^{-2} and 31 m^{-2} respectively. On the basis of Importance Value Index (IVI), *Peristrophe bicalyculata* and *Ageratum conyzoides* were the dominant herbs under *Robinia pseudoacacia* and mixed plantation

respectively. Distribution pattern reflexed that most of the ground flora species were contiguous. Index of dominance was found to be lower and diversity index were recorded higher for ground flora under plantations while compared with exposed mine overburden area. The ground flora under mixed plantation however, showed the highest diversity index (4.168). Index of dissimilarity between plantations and exposed mine overburden area was high thereby indicating remarkable degree of dissimilarity in ground flora species. Plenty of similarity between two plantations was however observed as far as ground flora growing under them was concerned. The chemical properties of soils as assessed under plantations showed improvement in fertility status while compared to exposed mine overburden areas.

94. **Kapoor, S.L., Sharma, P.C., Badola, D.P. & Kapoor, L.D. 1976.** "A botanical trip to Moralkanda (Himachal Pradesh)". *J. Bombay Nat. Hist. Soc.* 73(2): 329–347.

Abstract: A botanical excursion to the Moralkanda hill tract in Himachal Pradesh in the months of September and October resulted in a collection of 219 specific or infraspecific taxa of which 188 are dicotyledons, 17 monocotyledons, 5 gymnosperms and 9 pteridophytes. Moralkanda lies at 31°15' N and 77°45' E and falls outside the boundary of the area covered by Collett's (1902) Flora Simlensis. The specimens enumerated in the list are lodged in the herbarium of the National Botanic Gardens, Lucknow.

95. **Kapur, S.K. 1985.** "Observations on the floristic composition of Kangra valley (Himachal Pradesh)". *New Botanist* 12: 157–165.

96. **Kapur, S.K. 1986.** "Vegetable raw material resources of Kangra valley (Himachal Pradesh)". *J. Econ. Taxon. Bot.* 8(1): 65–76.

Abstract: The present communication deals with the systematic study of medicinal, aromatic and other economic plants of Kangra valley. One hundred sixty four plant species has been recorded along with their local names, distribution pattern, parts used, annual availability and uses.

97. **Kapur, S.K. & Sarin, Y.K. 1978.** "Contribution to the flora of Kangra valley. Part- I-Dharamshala-Palampur tract". *Bull. Bot. Surv. India* 20(1-4): 1–19.

Abstract: Systematic census of the flowering plants and ferns of the western portions of the Kangra valley of Himachal Pradesh has been done. Total number of species enumerated in this paper is 399 (Angiosperms 389, Gymnosperms 2 and Pteridophytes 8).

98. **Kapur, S.K. & Sarin, Y.K. 1985.** "Further contribution to the flora of Kangra valley: Dharamshala-Palampur tract". *J. Econ. Taxon. Bot.* 6(3): 563–572.

Abstract: This communication is the second in series of botanical exploration of flowering plants and ferns growing in the vicinity of Kangra Hills of Himachal Pradesh.

The paper includes 169 species, 143 genera and 89 families. The arrangement of families is in accordance to Bentham and Hooker (1862-1863) with minor modification.

99. **Kapur, S.K. & Sarin, Y.K. 1985.** "Some overlooked plant species of Himachal Pradesh– II". *J. Econ. Taxon. Bot.* 6(3): 705–707.

Abstract: The present paper deals with further additions of 55 species of plants (angiosperms and gymnosperms) from the state of Himachal Pradesh. These species are mostly collected from Mandi district.

100. **Kaur, H. & Sharma, M. 2004.** *Flora of Sirmaur (Himachal Pradesh)*. Bishen Singh Mahendra Pal Singh. Dehra Dun.

Abstract: This book deals with 898 species of seed plants belonging to 544 genera distributed among 139 families. In addition, 13 species have also been described under 'Addenda' making an aggregate of 911 species recorded from Sirmaur district of Himachal Pradesh. Besides, a comprehensive floristic account of the existing vegetation is given. Various analyses and information of miscellaneous sorts cover the phyto-geographic, ethnobotanical and conservational aspects. Dichotomous keys have been provided for the segregation of various taxa. 54 plates have been given along with the pertinent species.

101. **Kaushal, P., Gulhati, A.K., Sankhyan, H.P., Kumar, Sunil & Sharma, J.P. 2012.** "Structural parameters of woody elements in wildlife sanctuary, Sainj under GHNP, Kullu, Himachal Pradesh". *Indian J. Forest.* 35(3): 301–305.

Abstract: Ecological status of flora in Great Himalayan national Park (GHNP) (Wildlife Sanctuary- Sainj) was undertaken to evaluate the plant biodiversity of Great Himalayan Naional Park- Conservation Area (GHNP-CA) in Kullu district representing the biogeography zone-24 in North West Himalaya. A total of 832 plant species belonging to 427 genera and 128 families of higher plants were recorded within GHNP. During the vegetation survey of Wildlife Sanctaury- Sainj in different altitudinal zones, 28 species of trees were recorded. Some species of trees viz. *Picea smithiana, Pinus wallichiana* and *Abies pindrow*, are dominant species between the altitudes from 1500 to 3500 m. whereas, the species, *Prunus cerasoides, Morus alba, Hippophae salicifolia* and *Prunus* species are sparsely present in this area. The altitude from 1500-2000 m showed the highest richness and the highest evenness between altitude 2500-3000 m. It is also concluded that total number of species decreased with increase in elevation and diversity index value was high in lower elevation in comparison to higher elevation.

102. **Khatta, V. & Katoch, B.S. 1983.** "Nutrients composition of some fodder tree leaves available in sub-mountainous region of Himachal Pradesh". *Indian Forester* 109(1): 17–24.

Abstract: Ten species of fodder trees from the high rainfall mountainous zone (Palampur) and six species from the hot and humid Shivalik zone (Jawalamukhi) were selected for determining the comparative nutritive value, cell-wall and cell-contents. Macro-minerals (Ca & P) and traceminerals (Cu and Zn). The comparison was possible only in five specie, viz Siras (*Albizzia lebbek*), Tuni (*Cedrela toona*), Biul *(Grewia oppositifolia)*, Magar *(Banbusa arundinacea)* and Toot *(Morus alba)*. The crade protein (CP) and crude fibre (CF) levels are higher and nitrogen –free-extract (NFE) lower in the samples from high rainfall mountainous zone as compared to those of hot and humid Shivalik zone. Similarly the neutral-detergent fibre (NDF) and acid detergent fibre (ADF) levels are lower and reverse is the case for cell-Content in the samples from the first zone as compared to those of second zone. Exceptino Siras *(Albizzia lebbek)*, Tuni *(Cedrela toona)* and Dheon *(Artocrpus lakoocha)*, all the fodder tree leaves were sufficiently rich in copper viz. more than 1 mg/100 g, while all were deficient in zinc viz. Less than 5 mg/100 g except Toot (*Morus alba*) On the basis of overall chemichal analysis. Toot *(Morus alba)* stands first, successively followed by Biul *(Grewia Oppositifolia)*, Magar *(Bambusa arundinacea)* and Khirk *(Celtis australis)*. All of them were well adaptable for both the zones. Tuni *(Cadrela toona)* foliage however, has a very good nutritive value excepting deficient in trace-minerals, but its palatability is very poor. Similarly siras *(Albizzia lebek)* and oee *(Albizzia stipulata)* are not only nutritionally poorer but also prove sometimes toxic (fresh growth).

103. **Khosla, P.K., Chauhan, P.S. & Sood, Rajinder. 1969.** "Air-layering studies in some forest trees". *Indian J. Forest.* 2(2): 161–164.

Abstract: Trials on air-layering were conducted at Shilli nursery, Solan, Himachal Pradesh during pre-monsoon, i.e. mid March to Mid June 1977 and monsoon moths, i.e. end of June to end of September 1977 on five forest trees namely, *Quercus incana, Taxodium distichum, Pinus roxburghii, P. massoniana* and *P. radiata*. The application on various doses of IBA enhanced the callus and root formation. Q. *Incana* and *Taxodium distichum* responded abnormally to the higher doses of IBA treatments by showing a decline at 750 PPm IBA but showed an abrupt increase under 1000 PPM. Growth hormone treatment induced rooting in shorter duration.

104. **Kumar, Adarsh & Hingorani, G.R. 1973.** "Correct botanical identity of some established old exotics in Himachal Pradesh". *Indian Forester* 99(6): 380–390.

Abstract: The paper gives tbe correct botanical identity of twenty nine established exotics growing around Simla and Manali (Himachal Pradesh). It also gives in brief the botanical description, natural distribution, locality where introduced, year of planting (if available) height, and girth of the exotic species.

105. **Kumar, Ashish, Samant, S.S., Tewari, L.M. & Paul, Shiv. 2018.** "Diversity, distribution, indigenous uses and status of orchids in Kalatop-Khajjiar Wildlife Sanctuary, Chamba district, Himachal Pradesh". *J. Orchid Soc. India* 32: 93–98.

Abstract: Study was conducted to explore the floristic diversity of Kalatop-Khajjiar Wildlife Sanctuary in Chamba district, Himachal Pradesh during 2013–2017. As, this sanctuary has not been explored for the floristic diversity including orchids, an attempt was presently made to assess the diversity and indigenous uses of orchids, occurring in the sanctuary. Twelve species of the orchids were recorded; of these, 6 species were natives and 1 species were near endemic. These orchid species were distributed between 1900-2700 m amsl. Most of these species were used by the local inhabitatnts for curing wounds, cuts, cough, snake bite, a blood purified and tonic. Most of these species were found in shady moist cover floor. The high anthropogenic pressure and changing environmental conditions have increased the vulnerability of these species. Therefore, regular monitoring of the species in relation to climate change for understanding the dynamics and creating awareness among the local inhabitants and forest officials are suggested.

106. **Kumar, Ashwani & Jishtu, V. 2018.** "Studies on the yield *Fritillaria roylei* Hook.f., one important plant of the Ashtavarga group of Medicinal and Aromatic Plants (MAPs)". *J. Non-Timber Forest Prod.* 25(3): 175–178.

Abstract: The present investigation was carried out in Udaipur, Lahaul & Spiti, Himachal Pradesh. Seven treatments with three spacing were studied to observe the impact on growth parameters. Treatment of FYM + Vermicompost @ 10 ton per hectare gave maximum fresh weight of bulbs (6.197 g), dry weight of bulbs (3.314 g), total fresh yield of bulbs/ha (1254.4 kg) and total dry yield of bulb/ha (668.6 kg). Maximum values for fresh weight of bulbs (5.347 g), and dry weight of bulbs (2.865 g), total fresh yield of bulbs/ha (1254.4 kg) and total dry yield of bulbs/ha (668.6 kg) were recorded at S_3 (25 x 25 cm) spacing. Maximum values for total fresh yield of bulbs/ ha (1185.1 kg) and total dry yield of bulbs/ha (603.1 kg) were recorded in S_1 (20 x 20 cm) spacing.

107. **Kumar, Ashwani, Jishtu, V., Kumar, Dushyant & Bhushan, Brij. 2018.** "Studies on habitat of *Fritillaria roylei* Hook.f., an important plant of the Ashtavarga group of Medicinal and Aromatic Plants (MAPs) in Dhel Thach, Kullu, H.P.". *J. Non-Timber Forest Prod.* 25(1): 35–36.

Abstract: *Fritillaria roylei* Hook.f. is an important medicinal plant and is a member of the plants constituting in Ashtavarga. Due to medicinal importance and high market value, it being exploited heavily. The present paper is a communication results of the survey made on soil characteristics in the habitat of this plant in Dhel Thach, Kullu, Himachal Pradesh.

108. **Kumar, Deepak, Kumari, Pooja, Samant, S.S. & Paul, Shiv. 2016.** "Assessment of orchid diversity in selected sacred groves of Kullu district, Himachal Pradesh, India". *J. Orchid Soc. India* 30(1-2): 89–95.

Abstract: Sacred groves are the patches of forest with spiritual significance to people and communities. They are one of the most valuable practices of nature conservation. It is believed that these sacred groves are well protected by the village folk deities and largely free from anthropogenic activities. In India, about 13,270 such sacred groves have been reported, out of which the *Devbhumi,* in Himachal Pradesh supports about 5,000 sacred groves. These sacred groves have not been explored for the floristic diversity including orchids. Therefore, while exploring the floristic diversity, presently an attempt was made to assess the diversity and indigenous uses of orchids occurring in the sacred groves. Extensive surveys have been carried out in Hadimba Devi, Rupasana Devi, Shangchul Rishi, Bhrigu Rishi and Jamdagni Rishi sacred groves of Kullu district, Himachal Pradesh and a total of 7 orchid species have been reported. Four species are native and three are non-native. These orchid species were found to be distributed between 1500–2400 m amsl. *Calanthe tricarinata, Epipactis helleborine* and *Herminium lanceum* were reported from Hadimba Devi, *Epipactis helleborine, Habenaria edgeworthii* and *Herminium lanceum* from Rupasana Devi, *Cephalanthera longifolia, Epipactis helleborine, Habenaria edgeworthii* and *Spiranthes sinensis* from Shangchul Rishi, *Calanthe tricarinata* and *Habenaria edgeworthii* from Bhrigu Rishi and *Goodyera repens, Habenaria edgeworthii* and *Herminium lanceum* from Jamdagni Rishi, sacred groves. The reported species have relatively small populations. Some of these species were used for the treatment of various ailments such as wounds, cuts, cough and blood purification, *etc.* Therefore, regular monitoring of the populations of these species is required to understand the dynamics and their conservation status within the sacred groves.

109. **Kumar, J. & Kashyap, N.P. 1996.** "Diversity of bee flora in lower Kullu valley, Himachal Pradesh and its impact on honey production". *Indian Bee J.* 58: 131–134.

110. **Kumar, N. 2014.** "Studies on floral diversity of Joginder Nagar and adjoining areas, district Mandi, H.P., India". *Indian J. Fundamental & Appl. Life Sci.* 4(1): 189–195.

Abstract: Tehsil Joginder Nagar is famous for having three hydro electric power houses. It is repository of floral diversity, due to altitude variation and suitable climatic condition. Keeping the importance of this area, study was carried out in different areas of Tehsil Joginder Nagar during January 2013 to December 2013. Total 100 species belonging to 53 families and 91 genera were recorded. The plant specimens collected during the field visit were arranged alphabetically and preserved in the form of herbarium. All specimens were arranged as per Bentham and Hooker (1862-

1883) system of classification. Asteraceae represented with maximum number of species i.e. 8; followed by Fabaceae with 7 species; Cucurbitaceae and Euphorbiaceae with 5 species each. All plant species are provided along with their botanical name, family name, local name, English name and habit.

111. **Kumar, N. 2014.** "Studies on phytodiversity of Tehsil Joginder Nagar, district Mandi (Himachal Pradesh)". *Indian J. Pl Sci.* 3(1): 50–56.

Abstract: Himachal Pradesh is situated in the Western Himalaya region and consists of different types of forest. Floral diversity of any area provides both direct as well as indirect benefits to human being. Climate change is associated with increasing concentration of carbon dioxide and other greenhouse gases in the atmosphere. Floral diversity definitely plays a significant role in mitigating the adverse effects of climate change by increasing the level of carbon removals from the atmosphere. The present study was carried out to collect the information about floristic diversity of Tahsil Joginder Nagar. During the course of investigations, 100 plant species of 81 genera and 50 families belonging to two taxonomic groups i.e. angiosperms and pteridophytes were recorded. The plant specimens collected during field visits were preserved in the form of herbarium. The collected specimens were identified and arranged according to Bentham and Hooker (1862-1883) system of classification. Angiosperms were represented by 49 families and pteridophytes by single family (Adiantaceae). Out of 49 families of angiosperms, 39 families belong to dicotyledons and remaining 10 families were monocotyledons.

112. **Kumar, N. 2014.** "Important plants available at Herbal Garden of RI, ISM, Joginder Nagar, district Mandi, H.P., India". *Int. J. Geology, Earth & Environm. Sci.* 4(2): 150–157.

Abstract: Herbal Gardens are the places where plants of different types are grown for identification, educational and research purposes etc. In India, there are 71 gardens are registered as herbal gardens. Herbal garden provides living plant material for systematic studies and also helps to maintaining rare plant species. The present study has been carried out at Herbal Garden of Research Institute in Indian System of Medicine, Joginder Nagar, district Mandi of Himachal Pradesh during May 2012 to May 2014. Total 268 plant species of 215 genera and 103 families belonging to three different taxonomic groups i.e. angiosperms, gymnosperms and pteridophytes were recorded. All plant species were identified and enumerated with their botanical and family name.

113. **Kumar, N. 2015.** "Studies on floristic diversity of Joginder Nagar, district Mandi, Himachal Pradesh, India". *Indian Forester* 141(3): 383–341.

Abstract: 100 plant species of 90 genera and 65 families were collected from the area of tehsil Joginder Nagar, district Mandi, Himachal Pradesh. Among the 100 species, 45 species of herbs, 20 shrubs, 21 trees, 11 climbers, sedge 1 and 2 were

leafy fern. Out of 65 families, 60 belongs to angiosperms (53 belongs to dicotyledons and 7 to monocotyledons), 3 families belongs to Gymnosperms and 2 belongs to pteridophytes.

114. **Kumar, Puneet & Singhal, V.K. 2011.** "Chromosome number, male meiosis and pollen fertility in selected angiosperms of the cold deserts of Lahaul-Spiti and adjoining areas (Himachal Pradesh, India)". *Pl. Syst. & Evol.* 297(3-4): 271–297.

Abstract: In this study the exact chromosome number, detailed meiotic behavior in pollen mother cells and pollen viability were investigated, which can contribute to a better understanding of the cytological evolution of the species growing in the cold deserts of Lahaul-Spiti (Himachal Pradesh, India). This study is the first such comprehensive attempt to explore the region chromosomally. Chromosome number, meiotic behavior and pollen fertility were analyzed in 301 accessions of 140 species of Polypetalae. Chromosome counts in 14 species are the first ever records, viz., *Aquilegia pubiflora* (*n* = 7), *Corydalis govaniana* (*n* = 8), *C. thyrsiflora* (*n* = 8), *Hedysarum astragaloides* (*n* = 7), *H. microcalyx* (*n* = 7), *Oxytropis thomsoni* (*n* = 8), *Rhodiola tibetica* (*n* = 10), *R. wallichianum* (*n* = 16), *Rosularia alpestris* (*n* = 14), *Epilobium chitralense* (*n* = 18), *E. leiospermum* (*n* = 18), *Heracleum brunonis* (*2n* = 33), *H. thomsonii* (*n* = 11) and *Pleurospermum govanianum* (*n* = 9). New intraspecific diploid or polyploid cytotypes have been recorded in 13 species. The species of these cold deserts are quite active in evolution, depicting heterogeneity in chromosome number involving polyploidy, 51 species (36.43%) and / or aneuploidy (37 species). Various meiotic abnormalities were observed in the majority of the species, causing pollen sterility and pollen grains of variable sizes. We are of the opinion that harsh climatic conditions have caused various meiotic abnormalities in the majority of the plants, which has affected the genetic constitution and viability of male gametes.

115. **Kumar, P., Singh, H. & Kumar, A. 2018.** "A note on sustainable use of Himalayan Birch (*Betula utilis* D. Don) by local tribal community of Sechu-Tuan Nalla Wildlife Sanctuary, Chamba, Himachal Pradesh". *Indian Forester* 144(7): 686–687.

Abstract: The indigenous usage of naturally peeling off bark of *Betula utilis* is used by local tribal communities of Sechu-Tuan Nalla Wildlife Sanctuary, Chamba, Himachal Pradesh in their kitchens as napkins or as wrapping paper for cooked food. The bark is also used to cover the germinating seeds of some medicinally important species otherwise grown by locals for their daily requirements; helps prevent the seedling damage from snow and frost. The bark also finds its usage for making roofs of houses and shelter for cattle. Such use of bark as per the local community keeps the food fresh and healthy. The naturally peeling off bark of *Betula utilis* is the sustainable use of the available resources and it causes no harm to the tree and the bark si used is bio-degradable., unlike the aluminium foils that cause environmental degradation.

116. **Kumar, P., Singhal, V.K., Rana, P.K., Kaur, S. & Kaur, D. 2011.** "Cytology of *Ranunculus laetus* Wall. ex Royle from cold desert regions and adjoining hills of North-west Himalayas (India)". *Caryologia* 64(1): 25–32.

Abstract: Present work pertains to the cytological investigations performed in *Ranunculus laetus* for the first time from Indian cold deserts and adjoining high hills of North-west Himalayas which covers Chamba, Kinnaur, Kullu and Lahaul-Spiti districts of Himachal Pradesh. We here also report for the first time the presence of 1 B-chromosome in two accessions studied from Dalhousie hills. Twelve accessions scored presently from these regions uniformly shared the same meiotic chromosome number, n=14 and existed at tetraploid level (based on x=7). Of these, eight accessions showed abnormalities during male meiosis, such as pollen mother cells (PMCs) involved in chromatin transfer at different stages of meiosis, chromosome stickiness, pycnotic chromatin material, out of plate bivalents at metaphase-I, nonsynchronous disjunction of some bivalents, and laggards at anaphases/telophases. Consequent to these meiotic irregularities, microsporogenesis in meiocytes is abnormal characterized by the presence of dyads, polyads, and micronuclei and included micronuclei in sporads. These irregularities during meiotic course resulted into varying percentage of pollen sterility (9-31%) and pollen grains of heterogeneous sizes. The remaining four accessions showed regular meiotic course, normal microsporogenesis and nearly cent percent pollen fertility (97.90-100%).

117. **Kumar, R., Sharma, D.P., Bhat, A.F. & Thakur, L. 2016.** "Floristic diversity assessment of major forest community of Chail Wildlife Sanctuary in Himachal Pradesh". *Environm. & Ecol.* 34(4D): 2445–2452.

Abstract: The study was carried out at Chail Wildlife Sanctuary in Solan district of Himachal Pradesh during 2012-2013 with the aim to assess floristic composition, similarly index and dissimilarity index of major forest communities. Seven different major forest com-munities were selected viz., Chir forest, Oak forest, Deodar + Oak forest, Chir + Oak forest, Deodar forest, Deodar + Chir forest and Mixed forest. These forests comprised of 99 plant species and 42 families. Both Oak and Deodar + Oak forest community are similar in shrub composition and have maximum similarity index. Chir and Mixed forest community has minimum similarity index. Deodar + Oak and Mixed forest, Oak forest and Mixed forest has highest similarity in shrubs. Whereas, Deodar + Chir forest and Deodar +Oak forest community have lower similarity in herbaceous vegetation.

118. **Kumar, Sunil, Kaushal, P. & Kumari, Anita. 2013.** "Ecological status of woody elements in wildlife sanctuary Tirthan (GHNP-CA) Kullu, Himachal Pradesh". *Indian J. Forest.* 36(1): 119–123.

Abstract: Ecological status of the flora of Tirthan Wildlife Sanctuary was undertaken to evaluate the biodiversity of this area. During the vegetation of Wildlife Sanctuary Tirthan in the different altitudinal zone, 23 species of trees and 18 species of shrubs were recorded. In the various altitudinal zone, the altitude 2500-3000 m shows highest concentration of dominance, highest species diversity and also shows the highest evenness. The altitude 2000-2500 m shows the highest richness of the trees. The species *Celtis tetrandra* and *Taxus baccata* are the dominant species whereas the species *Abies pindrow, Cornus macrophylla* and *Cedrus deodara* are sparsely present in altitude from 1500 to 3000 m.

119. **Kumar, S. & Lal, P. 1989.** "A note on some interesting observations in *Cassia* from Bilaspur district (Himachal Pradesh)". *Indian J. Forest.* 12(2): 121.

Abstract: During critical study of the herbarium specimens of Bilaspur district (Himachal Pradesh) a very interesting specimen of *Cassia* was noticed. This plant showed similarities with *Cassia occidentalis* but differed in having abnormal leaf types (simple leaves as against compound) and a multicarpellate condition instead of monocarpellary one. The possible causes of such abnormalities are discussed here.

120. **Kumar, S., Gupta, N.K., Mahajan, P.K. & Shikha, D. 2015.** "Phytosociological status under Pink Cedar (*Acrocarpus fraxinifolius* Wight and Arn.) plantations in Himachal Pradesh". *Indian Forester* 141(12): 1252–1256.

Abstract: The present study was carried out at four sites. The spacing of site-I was 1.5m × 1.5m; site-II: 1.0m × 3.5m; site-III: 3.0m × 3.0m and site-IV: 4.0m × 4.0m at Solan, Himachal Pradesh. The maximum species diversity and basal area (BA) of grasses and herbs (56.65 cm^2/m^2) was at site-I having lowest plant spacing, with least basal area (BA) of shrub and woody regeneration (1.16 cm^2/m^2). *Lantana camara* and *Murraya koenigii* showed there presence at all the sites among shrubs, having dominance of *Lantana camara* at sites-I, -III and site– IV. *Apluda mutica, Chloris gayana* and *Chrysopogon montanus* were present in all the sites among different grasses and herbs, however, *Apluda mutica* showed dominance at site-I and site –III, while, *Chrysopogon montanus*dominated at site-II and site–IV. *Bidens pilosa* dominated at site-I and site–IV, while *Erigeron annus* was present at site-II and site–III among herbs. Maximum similarity (60.00 %) between site-I and site–IV was observed for grasses and herbs, however, for shrubs and woody regeneration, it (80.00 %) was observed between 3.0m × 3.0m (site-III) and 4.0m × 4.0m (site-IV) spacing.

121. **Kumar, V., Prakash, O., Singh, A., Lal, M., Marpa, S., Samant, S.S. & Bodh, M. 2017.** "Status, distribution and conservation of orchids in Great Himalayan National Park of Himachal Pradesh, Northwestern Hiamalaya". *J. Orchid Soc. India* 31(1-2): 1–8.

Abstract: The Indian Himalayan Region (IHR), one of the richest bio-geographic zones of India, stretches to about 3,000 km in length and varies from 200-300 km in width.

It covers nearly 17% of the total geographical area and 3.8% of the India's population. The location, climate and topography of the IHR have endowed it with rich and diverse life forms. The Great Himalayan National Park (GHNP) is one of the World Heritage sites, located in Kullu district of Himachal Pradesh, North Western Himalaya. It is well known for its rich faunal and floral diversity and important habitat for a large number of rare and threatened species. While exploring the floristic diversity of the GHNP, the intensive surveys were conducted to identify the diversity, distribution and status of the orchids. Rapid sampling method for the qualitative assessment and quadrat method for the quantitative assessment have been followed. A total of twenty one species of orchids representing 16 genera were recorded. These orchids were distributed between 2428–3820 m amsl and represented the shady moist, alpine meadows/ thatches, grassland, riverine, rocky, shrubbery and dry habitats. The species were analysed for nativity, threat categories and indigenous uses. Amongst the species, 12 species were natives and 9 species were non-natives. Of the total species, 6 species were found in the sites samples for quantitative assessment of vegetation. *Calanthe tricarinata* was recorded in maximum sites (10 sites), followed by *Dactylorhiza hatagirea* (8 sites), *Malaxis muscifera, Platanthera edgeworthii* (2 sites each and *Epipactis helleborine* and *Gymnadenia orchidis* (1 site each). Maximum orchids were found in shady moist habitat (15 species), followed by rocky (4 species), dry (2 species) and alpine, riverine and grassland (1 species each). The density of *Calanthe tricarinata* ranged from 0.05-1.3 Indm^{-2}, *Dactylorhiza hatagirea 0.06-0.8* Indm^{-2}, *Epipactis helleborine* 0.45 Indm^{-2},, *Gymnadenia orchidis* 0.15 Indm^{-2}, *Malaxis muscifera* 0.15-0.4 Indm^{-2}, and *Platanthera edgeworthii* 0.25-0.35 Indm^{-2},. Some of the species have medicinal properties and used for curing sores, eczema, fever, burns, blood purifier, tonic, cough, cold, cut, sexual disability, rheumatism, nervous disorder, female disorder, kidney disorder, spermopiotic, urinary problems, dysentery, sterility, etc. Maximum species were used as tonic (8 species), followed by for curing blood problems (6 species), fever, cough, spermopiotic and female disorder (3 species each) and burns, expectorant, cold, rheumatism, urinary disorder, dysentery, epilepsy (2 species each). Among the species, *Cypripedium himalaicum, Dactylorhiza hatagirea* and *Habenaria intermedia* were found to be Endangered and *Cypripedium cordigerum, Malaxis muscifera* and *Platanthera edgeworthii* as Vulnerable and *Herminium monorchis* Near Threatened and remaining species as Least Concern. Present study suggests that studies on various aspects like habitat ecology of these orchids for understanding the dynamics of their population, mass multiplication following conventional and *in vitro* propagation methods; educational and awareness programmes for the conservation of orchids need to be carried out.

122. **Kumari, K. & Saggoo, M.I.S. 2016.** "Cytomorphology of some medicinal grasses from Hangrang Valley of district Kinnaur, Himachal Pradesh". *Int. J. Pharm. & Pharmaceut. Sci.* 8: 187–190.

Abstract: The present study is focused on the chromosome number, their meiotic behavior, pollen fertility and medicinal importance of 6 species of grasses from the remote high altitude region of Kinnaur, Himachal Pradesh. Methods: The young spikes of suitable sizes were fixed in carnoy's fixative (6 ethanol: 3 chloroform: 1 acetic acid v/v) for 24 h and preserved in 70% alcohol at 4°C until use. For meiotic studies, anthers were squashed in 2% acetocarmine. Pollen fertility was examined using the glycerol-acetocarmine method. Results: The species studied have shown chromosome numbers like *Arundo donax* (n=12), *Avena fatua* (n=21), *Cynodon dactylon* (n=18), *Cymbopogon distans* (n=20), *Eleusine indica* (n=9), *Sorghum halepense* (n=20). The medicinal uses, other traditional uses and the cytological analysis of these grasses belonging to family Poaceae are studied for the first time from the study area. Conclusion: The present exploration gives useful information regarding the chromosome number and various meiotic irregularities including their medicinal importance.

123. **Lal, M. 2007.** *Assessment of Floristic Diversity and Conservation Status of Plants in Kais Wildlife Sanctuary of Himachal Pradesh in Northwestern Hiamalaya.* Ph.D. Thesis, Kumaun University, Nainital, India (Unpublished).

124. **Lelle, V.C. & Misra, D.P. 1961.** "Some unreported wild and naturalised flowering plants of Simla Hills". *Himachal Hort.* 2(1): 5–8.

125. **Luna, R.K. & Sharma, S.C. 2006.** "Seed source variation in morphological characters and oil content of *Jatrophaa curcus* Linn. in North-West India". *J. Non-Timber Forest Prod.* 13(3): 221–225.

Abstract: Variation in different seed morphological and fatty oil contents were studied among 25 seed sources from Punjab, Himachal Pradesh, Jammu & Kashmir and Uttaranchal. Though statistically significant differences were found for fruit diameter, number of seeds in a fruit, seed length, seed width, seed thickness, weight of 100 whole seeds, weight of seed coat of 100 seeds and weight of kernels of 100 seeds among different sources, no seed source was found to be the best for all traits. Seed source S_{20} (U.P. Dunera, Gurdaspur Forest Division) gave the maximum oil content of 33.10 per cent, which however, was much lower as compared to Chhindwara source of Madhya Pradesh which is reported to yield 39.12 per cent oil (on whole seed basis). The study, therefore, cautions that provenance research should be done before undertaking large scale plantation to avoid any unsavoury situation.

126. **Mahajan, P.K. & Dhall, S.P. 2002.** "Trends and distribution pattern of forests in Himachal Pradesh". *Indian Forester* 128(11): 1245–1247.

Abstract: This study highlights the fact that the trends in the area under forest are not regular though the increase in the forest area in Himachal Pradesh was observed to

be about 77 percent over the 17 years period ranging from 1979–1980 to 1995–1996. Almost perfect positive correlation is noted between change in 'total forest area' and 'protected forest area' when the effects of the variables such as 'reserved forest area', 'unclassified forest area', 'forest area not under the control of Forest Department' have been eliminated.

127. **Man, V., Verma, R.K., Chauhan, N.S. & Kapoor, K.S. 2012.** "Phytosociological attributes of Porang valley in Lippa-Asrang Wildlife sanctuary of district Kinnaur, Himachal Pradesh". *Ann. Forest.* 20(1): 1–16.

Abstract: A study was conducted to understand the plant diversity and phytosociological attributes of the Porang valley at elevation varying from 3300-5000 m in Lippa-Asrang Wildlife sanctuary of district Kinnaur, Himachal Pradesh during 2008. Total number of plant species was 138 representing 93 genera and 38 families. The number of tree species was 6 with the dominance of *Juniperus polycarpos* at 3300-3800 m elevation. Whereas, number of shrub species was 17 and 7 with the dominance of *Juniperus indica* and *Berberis jaeschkeana* at 3300-3800 m and 3800-4600 m elevation respectively. The number of herb species was 80, 51 and 33 with the dominance of *Thymus linearis*, *Potentilla cuneata* and *Arenaria bryophylla* at 3300-3800 m, 3800-4400 m and 4400-5000 m elevation respectively. Index of diversity for herb species in different altitudinal ranges was 4.15, 3.64 and 3.37 respectively. The distribution pattern of plant species was mostly contiguous in all the altitudes. Out of 56 plants of medicinal value recorded from the area, 16 species fall in the category of threatened plants.

128. **Marpa, S. & Samant, S.S. 2012.** "Diversity and conservation status of orchids in and around Prashar Sacred Shrine in Himachal Pradesh, India". *J. Orchid Soc. India* 26(1-2): 83–87.

Abstract: While exploring the floristic diversity of Prashar Sacred Shrine, a total of 16 species of the orchids representing 13 genera were recorded. These species were distributed between 1800-3000 m amsl and grew in forests, alpine meadows/ thatches and riverine habitats. They were analysed for nativity, endemism and rarity besides their indigenous uses. Ten species are native, six non-native, and one near endemic. Some of them find utility as aphrodisiacs, tonics, appetizers, blood purifiers, and in curing a variety of diseases. Four species are critically endangered, 4 endangered, 6 vulnerable, and 2 near threatened. Habitat degradation, over exploitation and changing environmental conditions has detrimentally affected the natural orchid population. Several measures have been suggested for their conservation and management.

129. **McDonell, J.C. 1882-1883.** "A trip through Chamba". *Indian Forester* 8: 33, 38, 168–171, 272-274; 9: 18–20.

130. **Meena, Rajesh, Kumar, Vikas, Verma, T.P., Yadav, R.P., Mahapatra, S.K., Surya, Jaya N., Singh, Dharam & Singh, S.K. 2019.** "Local perceptions and adaptation of indigenous communities to climate change: Evidences from High Mountain Pangi valley of Indian Himalayas". *Indian J. Tradit. Knowl.* 18(1): 58–67.

Abstract: The present study was undertaken with aim to understand the perceptions of indigenous communities about climate change pattern and its local impacts on climate variables, seasons, agriculture, biodiversity and adaptive strategies in geographical and technological-isolated *Pangi* valley situated in Chamba district, Himachal Pradesh. Randomly selected 120 respondents were interviewed and their perceptions were recorded on pre-designed questionnaire. The climate change impacts are experienced in the form of decreased snowfall (98.3%), temperature rise (97.5%), late onset of monsoon (90.8%), decreased rainfall (76.7%), reduced snow-melted water availability (86.7%) and increased drought incidences (85.8%) of over the years. Further, these climatic changes affecting agriculture through early shifts in crop season (80.8%), shorter growing season (91.7%), introduction of fruit and vegetable crops (90.8%), increased incidence of insect-pest (81.2%) and diseases (84.2%) and thereby decline in crop yield (70%). However, majority of the respondents undertaken adaptive strategies such as crop diversification, traditional mixed-cropping, mixed farming, crop rotation and agro-forestry/agro-horticulture systems to cope with climate change but they are either little or unaware of modern farming practices such as snow water/glacier runoff harvesting, agro advisory services, mulching and zero tillage as adaptation strategies. (References to be seen)

131. **Mir, Zahoor Ahmad, Giri, Nishita & Kumar, Pramod. 2011.** "Ecological studies of woody species in Chaupal Forest Division of Himachal Pradesh". *Indian J. Forest.* 34(4): 433–438.

Abstract: A detailed ecological analysis of woody species of the Chaupal Forest Division, Himachal Pradesh, was carried out at five sites under different altitudes and aspects. The study revealed that the total basal area cover of the forests varied between 0.093 m^2/ha (*Alnus nepalensis*) at Site-IV, whereas 46.682 m^2/ha at Site-V (*Cedrus deodara*). The distribution pattern was found regular, random and contagious. Species diversity index was found maximum 1.595 at Site-IV and miimum 0.574 at Site-I whereas species richness was found highest 9 (Site-V) and lowest 2 (Sites-I and II).

132. **Misri, B. & Sareen, S. 2004.** "Regeneration potential of mid-hill Himalayan grasslands of Himachal Pradesh". *Indian Forester* 130(11): 1299–1302.

Abstract: The utilization pattern of mid-hill Himalayan grasslands in Himachal Pradesh is traditional. These grasslands are closed to grazing before onset of monsoon in the month of June and the herbage harvested in October, is conserved for use during winter. The grasslands are then opened for indiscriminate grazing till next monsoon.

Thus, the total biomass available is 1.0-2.0 tlha (dry matter). However, the present study undertaken at Palampur during 1997-98 on well protected grassland revealed that the grasslands have the potential to provide herbage under frequent cuttings, if they are protected from grazing. Under monthly cutting regimes biomass up to 79.53 t/ha (green) and 15.98 t/ha (dry) was obtained during 1997-1998.

133. **Murti, S.K. 1987.** "A taxanomic study of some Cyperaceae of North-West Himalayan and sub-Himalayan tract". *J. Econ. Taxon. Bot.* 9(2): 329–341.

Abstract: The paper deals with the sedge flora comprising 8 genera and 28 species of the north-west Himalayan and sub-Himalayan tracts. Key to genera and species are provided.

134. **Murti, S.K. 2001.** *Flora of Cold Desert of Western Himalaya 1. Monocotyledons*. Botanical Survey of India, Calcutta.

Abstract: The book deals with 347 species belonging to 103 genera under 16 families of monocot group of angiosperms from Cold Desert of Western Himalaya.

135. **Murti, S.K. & Uniyal, B.P. 1985.** "Some overlooked plant species of Himachal Pradesh". *J. Econ. Taxon. Bot.* 6(3): 705–707.

136. **Nair, N.C. 1964.** "On a botanical tour to Lahul and Spiti (Punjab Himalayas)". *Bull. Bot. Surv. India* 6(2-4): 219–235.

Abstract: This paper gives an account of the vegetation covering the area from Rohtang Pass to Shitikar; of the Lahul and Spiti valley which the author visited in 1961. Collections made from Manali and Koti are also included in list of enumeration of plants.

137. **Nair, N.C. 1977.** *Flora of Bashahr Himalayas*. International Bio-Science Publishers, Hissar, Madras.

Abstract: The present book is an outcome of a comprehensive survey of flora of Old Bashahr State, comprising of two present districts of Himachal Pradesh namely Kinnaur and Mahasu (including Simla). Total 1629 species belonging to 709 genera and 137 families including Gymnosperms and Angiosperms along with a brief systematic account of the species and their currently accepted botanical anme, synonymy, flowering time and specimens examined etc.

138. **Negi, P.S. & Subramani, S.P. 2015.** "Wild edible plant genetic resources for sustainable food security and livelihood of Kinnaur district, Himachal Pradesh, India". *Int. J. Conserv. Sci.* 6(4): 657–668.

Abstract: In view of changing food habits of local communities of Himachal Himalaya, a study to document the genetic resources of wild edible plant and traditional recipes was conducted in Kinnaur district of Himachal Pradesh, India. Rituals and cultural beliefs of the local people of Kinnaur plays significant role in conserving biodiversity. A total

of 116 plant species belonging to 42 families were recorded from the study area. Among the four major life forms, herbs contributed the highest proportion of the edible species (57) followed by trees (32), shrubs (26) and climber (1). Fruits (50) are the highly consumed plant parts, followed by leaves (33), seeds (23), bulbs (6), resin/ gum (6), roots (5), flowers (4), shoots (4), bark (2) and tubers (2) respectively. Chilgoza nut is the dominant wild edible and also the main source of revenue. This includes 13 threatened species under different Red List categories of IUCN 2000 and 8 species are endemic to Western Himalayas. *Allium stracheyi, Angelica glauca, Betula utilis, Bunium persicum, Dioscorea deltoidea, Hippophae* spp., *Juglans regia, Pinus gerardiana, Prunus armeniaca, Prunus mira and Sinopodophyllum hexandrum* are highly exploited species in wild and need to be conserved.

139. **Negi, R., Verma, P.K., Baig, S., Chandra, Anup, Naithani, H.B., Verma, R. & Kumar, Anoop. 2019.** "Checklist of family Poaceae in Lahaul and Spiti district (Cold Desert), Himachal Pradesh, India". *Pl. Sci. Today* 6(2): 270–274.

Abstract: The present study provides an overview of the diversity and distribution of grass species in Lahaul-Spiti district (cold desert) situated in the Trans-Himalayan region i.e. Himachal Pradesh, India. From the study area 141 taxa (138 species and 3 subspecies) belonging to 14 tribes were recorded. The largest tribe was Festuceae followed by Agrostideae having 48 and 20 species, respectively. Two species *Poa koelzii* and *P. Lahaulensis* are endemic to Lahaul- Spiti. *Puccinellia kashmiriana* is rare as per IUCN status. The present study on the grass floral wealth of Lahaul-Spiti provides an important baseline data on grasses for further quantitative and qualitative investigations like their nutritive values, crop improvement programmes and shall also help in the identification of priority conservation areas in the region.

140. **Negi, S.P. 2017.** "Agroforestry potential for increasing forest and tree cover in Himachal Pradesh– An analysis". *J. Non-Timber Forest Prod.* 24(4): 185–190.

Abstract: Forests and trees are essential for the welfare of people and play significant role in sustainable development. Extent of forest resources is one of the criteria for monitoring the progress towards sustainable forest management. The total forest and tree cover of Himachal Pradesh is 15,453 km^2 which is 27.76 per cent of the state's geographical area. As per National Forest Policy, 1988, the aim should be to maintain two-third of the geographical area of the state under vegetal cover in the hills and in mountainous regions; but there is very little scope for realizing the envisaged target in near future in the state. There is no enough culturable land in the state, as large area of the state is covered under alpine pastures, barren and unculturable wastelands and snow bound areas where trees do not grow. Agriculture in the state is mainly subsistence, and hence there is not much scope of expanding agroforestry in these marginal lands. Therefore, it is prudent to focus more on protecting the existing

unspoiled forests, eco-restoration and qualitative improvement of the degraded forests. Positive environment towards agroforestry plantation in the state will motivate the farmers to reap the incentives under sub-mission of agroforestry which will not only fulfil the multiplicity of local requirements but also reduce the pressure on existing forests.

141. **Nagi, S.S. 1977.** "Fodder trees in Himachal Pradesh". *Indian Forester* 103(9): 616–622.

Abstract: Apropos the plantation of fodder trees in Himachal Pradesh the aspects of some potential tree fodders in the state are discussed. Possibility of converting the nutritious tree leaves harvested at the right a protein-rich meals is indicated.

142. **Negi, V.M. & Dutt, B. 2008.** "Diversity and distribution pattern of high altitude medicinal and aromatic Plants of Sangla valley in Himachal Pradesh". *Ann. Forest.* 16(1): 112–118.

Abstract: Species composition and distribution pattern of Medicinal and Aromatic Plants (MAPs) was analyzed at four different sites of altitude ranging from 3600-4800 m above msl of Sangla valley of district Kinnaur in Himachal Pradesh. For conducting phytosociological studies, complete survey of the area was carried out to select four sites, keeping in view richness of medicinal and aromatic plants. At all the four sites *Jurinea dolomiaea* and *Corydalis govaniana* were, respectively, the most and least represented herb species, whereas, *Rhododendron anthopogon* was most represented and *Cassiope fastigiata* was the least represented shrub species. Most of the herb species showed contiguous distribution, followed by random, whereas all the recorded shrub species showed random followed by contiguous distribution pattern. However, most of these species are on the verge of extinction due to various factors like lack of ecological knowledge of these plants, over-exploitation for economic gain, grazing etc. For the scientific management of these plant species the study of the soil, geology, climate, associated vegetation and resource availability in their natural habitat are pre-requisite before the endemic diversity of these plant species wiped out from the nature.

143. **Oinam, S.S., Rawat, Y.S., Khoiyangbam, R.S., Khwairakpam, G., Kuniyal, J.C. & Vishvakarma, S.C.R. 2005.** "Land use and land cover changes in Jahlma watershed of the Lahaul valley, cold desert region of the northwestern Himalaya". *Indian J. Mount. Sci.* 2(2): 129–136.

Abstract: Land use and land cover changes that occurred during the period from 1991 to 2001 in the Jahlma watershed of the Lahaul valley, a cold desert region of the northwestern Himalaya, were evaluated using land use data and visual interpretation of IRS Satellite imageries. The results revealed that out of the six major land use forms within the watershed, land areas under agriculture, kitchen garden

and settlement land were found increased, whereas a declining trend was recorded in areas under grassland, barren land and *Salix* plantation. The cultivated land within the watershed increased from 54.87% (total of agriculture land, kitchen garden, grassland, barren land, *Salix* plantation and residential area) in 1991 to 56.89% in 2001, corresponding to an expansion of 4.41 ha. On the other hand, the areas of grassland decreased from 31.41% in 1991 to 29.81% in 2001. Such a dramatic land use and land cover changes taking place within the 33 km- watershed area in a single decade clearly indicates the prevailing danger of land degradation and environmental deterioration in the region.

144. **Pal, D.K., Kumar, Amit & Dutt, B. 2014.** "Floristic diversity of Theog Forest Division, Himachal Pradesh, Western Himalaya". *Check List* 10(5): 1083–1103.

Abstract: We provide a check list of the vascular plants of Theog Forest Division, Himachal Pradesh, Western Himalaya. Himachal Pradesh has been extensively surveyed in terms of flora by a large number of workers, albeit highly confined to prioritized areas. The floristic inventorization resulted in a total of 442 vascular plant species belonging to 311 genera and 117 families from an area of 512 km^2. Out of these, 408 species belonged to angiosperms, 7 to gymnosperms and 27 to pteridophytes. The predominant families among dicotyledons were Asteraceae, Rosaceae and Lamiaceae. Among the monocotyledons, the most represented family was Poaceae, followed by Liliaceae and Cyperaceae. Pinaceae and Pteridaceae were found to be the most represented families among the Gymnosperms and Pteridophytes, respectively. Species richness was highest in shrubberies, which formed an ideal habitat for many herbaceous species within different habitat types. Strategic eradication of weed species, especially obnoxious species such as *Lantana camara* and *Parthenium hysterophorus* is required for effective management in the area.

145. **Pant, S. & Samant, S.S. 2008.** "Population ecology of the endangered Himalayan Yew in Khokhan Wildlife Sanctuary of North Western Himalaya for conservation management". *J. Mountain Sci.* 5(3): 257–264.

Abstract: The Himalayan Yew (*Taxus baccata* subsp. *wallichiana*) is an endangered native high value medicinal plant of the Himalayan Region. The several medicinal properties of the bark and leaves of this species have increased its risk of extinction due to pressures for utilization. It is also subjected to harvest for fuelwood. The species does not regenerate well from seed and that is another risk factor. The objective of this research was to investigate the population ecology of the species as a foundation for its conservation. Six forest communities in the Khokhan Wildlife Sanctuary where the species is present were sampled. The abundance of the species, impacts of harvesting and its current regeneration patterns indicate that it may soon be extirpated from the Sanctuary. A plan for conserving the remaining sub-

populations is presented. It could provide a template for conservation in other locations where the species is at risk.

146. **Pant, S. & Samant, S.S. 2012.** "Diversity and regeneration status of tree species in Khokhan Wildlife Sanctuary, north-western Himalaya". *Trop. Ecol.* 53(3): 317–331.

Abstract: The Khokhan Wildlife Sanctuary (KhWLS) located in the Kullu district of northwestern Himalaya and covering an area of 14 km^2 has not been explored for documenting the structure and composition of vegetation. In this study we examine the site/habitat characteristics, assess the diversity of tree species, delineate forest tree communities, assess the regeneration pattern of tree species, and suggest conservation measures. Sixty-five sites were sampled between 1640 - 2400 m asl and for each site, habitat characteristics, altitude and dominant species were noted. Seventeen forest tree communities were recorded. *Cedrus deodara* community was the most widely distributed followed by *Quercus leucotrichophora, Abies pindrow* and *Quercus semecarpifolia* communities. *Cedrus deodara* community had maximum density of trees (1468 Ind/ha), seedlings (1290 Ind/ha) and saplings (1172 Ind/ha), while *Picea smithiana* community recorded the maximum total basal area (186.2 m^2/ ha). Of the 17 forest tree communities identified, eight showed maximum regeneration of the dominant species, six showed maximum regeneration of the co-dominant species indicating the possibility of at least partial replacement of the dominant species by the co-dominant species in the future; and three communities showed poor or no regeneration of the dominant species indicating a total replacement of the dominants in the coming years. Long term monitoring of these tree communities for their conservation management is suggested.

147. **Pareta, K. & Pareta, U. 2014.** "Climate change impact on land and natural resource in Chamba tehsil of Himachal Pradesh state, India". *Int. J. Sci. & Technol.* 2(4): 38–48.

Abstract: Climate change is one of most important issues facing the world today. Satellite based remote sensing data has providing key improvements to understand the climate changes impact on land and natural resource, by quantitative methods and spatio-temporal statuses of the land. Climatic change factors like temperature, evaporation, solar radiation, air impurities and precipitation are directly (due to changes in atmospheric carbon dioxide/climate) and indirectly (through complex interfaces in ecosystems) affect the land and natural resource. Output of this paper has approaching that climate change is not only an issue of the worldwide, but it is now a local problem in Himachal Pradesh / India. Due to climate change, temperature of the Chamba tehsil from Period-1 (1990-2001) to Period-2 (2002-2013) has increased form 19.28°C to 19.79°C (+0.52° C), while precipitation has reduced from 1037.93 mm to 683.97 mm (- 353.97 mm), as well as agricultural land from 2001 to 2013 has

reduce 41.42 Sq. Kms (-4.09%), dense forest has also reduce with 112 Sq. Kms. Soil erosion for the same period has increased approx. 76.50% (24.42 tons/ha/yr.).

148. **Parker, R.N. 1938.** "Collett's Flora Simlensis". *Indian Forester* 64(1): 3–7.

Abstract: A few species found in the Simla neighbourhood are mentioned as having been omitted from Collett's Flora Simlensis and as they are not numerous it is concluded that the Flora was reasonably complete. Changes that have taken place in the vegetation are the disappearance of the more ornamental plants due to picking flowers and digging up roots. Additions have occurred owing to exotic weeds and garden plants becoming established of which a list is given.

149. **Poonam, Bawa, R. & Sharma, S.S. 2016.** "Changing economy and livelihood options in cold deserts of Himachal Pradesh, India: Threat to biodiversity". *Indian J. Forest.* 39 (4): 327–333.

Abstract: The present investigation was conducted in village Goshal, located in Lahaul and Spiti cold desert district of Himachal Pradesh, India during 2010 to 2013, to assess economic gains from traditional and present day cash cropping and sustainable harnessing of the limited natural resources and their intricate utilization. We found that the major part of the energy and biomass recycle within the system through traditional cropping (Barley). We calculated the input output ration which for Barley comes out to be 1:1.29, however in case of cash crops (Pea and Potato) the input: output ratio was quite high, for potato the ratio comes out to be 1:3.47 and for Pea ratio was 1:2.43 (if labour and FYM cost is added), thus higher than Barley. This is the basic reason for shifting of the farming community from traditional crops to the plantation of cash crops. Thus the present study was undertaken to generate a strong database, not only for estimating the present status of various natural resources but this would also be of great help for researchers working in such harsh areas in other parts of the world, planners and decision makers for drawing interlinked sustainable developmental plans for the area for better socioeconomic status and restricting further desertification.

150. **Poonam, Nayak, D. & Bawa, R. 2017.** "Nutrient loss from the major ecosystems of cold desert of Himachal Pradesh, India". *Indian J. Forest.* 40(3): 255–260.

Abstract: The present investigation was conducted in village Goshal, located in Lahaul and Spiti district of Himachal Pradesh, India, during 2010 to 2013 to assess nutrient status and nutrient flow in two major ecosystems viz., Agro ecosystem and Alpine Pasture ecosystem. In Alpine Pasture ecosystem of the 70 per cent above ground biomass which is grazed by the animals, 50 per cent decomposed after penning and returned back to the system, and rest 50% goes to the yard and in the form of FYM goes to the agricultural fields thus removed out of the system. In Agro ecosystem,

since 90 per cent of above ground biomass is harvested for fodder and winter stall feeding and in the form of FYM it returns back to agricultural fields and 100 per cent of below ground and 10 per cent of above ground nutrient remains as such in the field, which get decomposed and the nutrients are returned back to the system.

151. **Poonam, Bawa, R., Sankhyan, H.P. & Nayak, D. 2018.** "Biodiversity loss and conservation of natural resources in Cold Desert ecosystem of Himachal Pradesh, India". *Indian Forester* 144(9): 817–824.

Abstract: The present investigation was conducted in village Goshal of district Lahaul and Spiti, (Himachal Pradesh), India, by differentiating the village into three ecosystems viz., Forest ecosystem, Alpine ecosystem and Agro ecosystem to carry out phyto-sociological studies. Each ecosystem was divided into nine different grids for sampling following quadrate method. Three quadrates were laid in each grid in all the three ecosystems for recording of phytosociological data. In forest ecosystem, among trees, the species of maximum occurrence was *Juniperus recurva* (IVI 62.89), while in alpine ecosystem *Dactylis glomerata* (IVI 62.49) dominated among grasses having maximum percentage contribution (20.83%), and *Juniperus communis* among shrubs. In agro ecosystem, *Dactylis glomerata* and *Agropyron longearistatum* among grasses were found to be the most dominating species with average IVI value of 50.70 and 49.30, respectively. Among agricultural crops, the maximum area was occupied by the cash crops like peas and potato. Peas were sown in 60.19 per cent of the total cropped area. It was observed that farmers have switched over to the cropping of cash crops which are economically beneficial and is affecting the present status of surrounding natural resources resulting in loss of biodiversity.

152. **Poonam, Bawa, R., Sharma, A. & Sankhyan, H.P. 2018.** "Photosynthesis and water use efficiency of important species of cold desert of Himachal Pradesh, India". *Indian J. Forest.* 40(1): 41–46.

Abstract: The present study was conducted in Goshal, one of the largest villages of cold desert district of Lahaul in Himachal Pradesh, India during 2010 to 2013 to carry out photosynthetic study and water use efficiency of various species growing in the cold deserts. We classified the study area into three major ecosystems viz., Forest ecosystem, Alpine Pasture ecosystem and Agro ecosystem and found that in Forest ecosystem *Salix alba* was most water use efficient tree with maximum photosynthetic rate of 36.61 μ mol/m^2/sec. However, in case of Alpine ecosystem *Podophyllum peltatum* (0.014534) and *Artemisia brevifolia* in Agro ecosystem was most water use efficient species. Thus we recommended these species for agroforestry and aforestation purpose in the cold desert area as dry land cultivation is not possible in Agro ecosystem and for cultivated area the only source of water is through glacial melts from the upper mountain reaches.

153. **Poonam, Bawa, R., Sankhyan, H.P., Nayak, D. & Sharma, S.S. 2015.** "Land use ecology of major ecosystems in cold desert of Himachal Pradesh". *Indian J. Forest.* 38(4): 295–301.

Abstract: The present study was conducted in Goshal, one of the largest villages of Lahaul valley of Himachal Pradesh during 2010 to 2013 to study the land use pattern of village Goshal by classifying the study area into three major ecosystems viz., Forest Ecosystem, Alpine Pasture Ecosystem and Agro-ecosystem and to assess the soil physical properties of these ecosystems. Land use pattern in agro ecosystem revealed that of the total area of village Goshal, maximum area was occupied under second grade irrigated area and maximum area under non cultivable lands was reported under grasslands. Pre-occupied maximum percent area which showed the shifting of the farming community from traditional cropping pattern to cash crops. It was further observed that the villagers opted plantations of Poplars and Willows. The soil physical properties of all the three ecosystems were found medium in available nutrient status.

154. **Prakash, Om, Samant, S.S., Yadava, A.K., Kumar, Vijay & Dutt, Sunil. 2018.** "Orchid diversity at Pangi valley of Himachal Pradesh, Northwestern Himalaya". *J. Orchid Soc. India* 32: 45–54.

Abstract: Orchidaceae is amongst the most diverse and widespread families of flowering plants with uniquely colourful and fragrant flowers. The status and distribution pattern of orchids was examined in Pangi valley, district Chamba of Himachal Pradesh, North Western Hiamalaya. Pangi valley supports unique, natural, ecologically and economically important orchids of Great Himalayan range. Quadrat method was followed for the quantitative assessment of orchid species. A total of 17 species or orchids representing 11 genera were recorded. These were distributed between 2100-4500 m amsl and found in shady moist, alpine meadows/thatches, grassland, riverine, rocky, shrubby and dry habitats. The species were analysed for nativity, endemism, threat categories and indigenous uses. Amongst the studied species 10 were natives, 4 non-natives, 3 near endemic. On the total species, 8 species were found in the sites sampled for quantitative assessment of vegetation. *Cephalanthera longifolia* was recorded at maximum sites (9 sites), followed by *Dactylorhiza hatagirea* (8 sites), *Calanthe plantaginea* and *Epipactis helleborine* (6 sites), *Platanthera edgeworthii* and *Malaxis muscifera* (2 sites, each) and *Cypripedium cordigerum* and *Gymnadenia orchidis* (1 site, each). Maximum orchids were found in shady moist habitat (11 species), followed by rocky (3 species), dry (2 species) and alpine, riverine and grassland (1 species each) habitats. The density of *Cephalanthera longifolia* ranged from 0.1-0.25 Ind m^{-2}, *Dactylorhiza hatagirea* 0.05-0.85 Ind m^{-2}, *Calanthe plantaginea* 0.05-0.50 Ind m^{-2}, *Epipactis helleborine* 0.05-0.40 Ind m^{-2}, *Malaxis muscifera* 0.20-0.40 Ind

m^{-2}, *Platanthera edgeginea* 0.05-0.10 Ind m^{-2}, *Cypripedium cordigerum* 0.55 Ind m^{-2} and *Gymnadaenia archidis* 0.85 Ind m^{-2}. Some of the species have medicinal properties and are used to cure sores, eczema, fever, burns, cough, cold, cuts, sexual disability, rheumatism, nervous disorder, female disorder, kidney disorder, spermopiotic, urinary problems, dysentery, sterility, etc. Maximum species are known to be used as tonic (7 species), followed by blood problems (5 species), fever, cough, spermopiotic and female disorder (3 species each) and burns, expectorant, cold, rheumatism, urinary disorder, dysentery, epilepsy (2 species each). Among the species, *Cypripedium himalaicum, Dactylorhiza hatagirea* and *Gabenaria intermedia* were endangered, *Cypripedium cordigerum, Malaxis muscifera* and *Platanthera edgeworthii* as vulnerable, *Herminium monorchis* as Near Threatened and remaining species as Least Concerned. Studies on habitat ecology of these orchids is important for understanding the dynamics of their population, mass multiplication following conventional and *in vitro* propagation methods and conservation.

155. **Punam, A. & Sharma, S. 2002.** "The medicinal wealth of Western Himalayan agro-ecological region of India: I. An inventory of herbs". *Ann. Forest.* 10(1): 28–41.

Abstract: Due to rentless exploitation many medicinal herbs are lost even before they are validated for their potential use of drugs. These species needs to be further investigated for standardization of active compounds. This paper aims at providing multidisciplinary compendium information on medicinal wealth of Western Himalayan agro eco region so that their efficient conservation, sustainable utilization and commercial utilization can be achieved.

156. **Punam, A., Sharma, S. & Raj, N. 2001.** "Conservation of *Colchicum luteum* – A medicinal plant of Himachal Himalayan Cold Desert". *Ann. Forest.* 9(1): 17–22.

Abstract: *Colchicum luteum*, a highly precious medicinal herb is found at 2200 to 2800 m amsl in north Western Himalayas. As a result of continuous and rentless extraction during the course of many decades, this medicinal plant species is facing danger to its very survival in its natural abode. Seed and corms (fleshy underground stems) are the plant parts, which are commonly used for the commercial purpose being the rich source of an active principle alkaloid- colchicines. *Colchicum* has a very short growth period and burial of six months under snow is a pre-requisite for the sprouting of its corms. Keping in view the short growth period of the plant and its endangered status, there is a dire need not only to cultivate this plant but also to store/conserve its germplasm. The present investigation was undertaken to select best storage condition, which can maintain the corm in a dormant condition and restore its health for an optimum period. Before the process of sprouting/regeneration starts. The corms procured from the cold desert zone of Himachal Himalayas were stored in different media/conditions viz., pure sand (25°C), soil mixture (25°C), soil from natural

habitat (25°C) and also in BOD (9°C) and refrigerator (4°C) conditions for nine months period i.e. from the month of May to November 1999. The significantly highest number of healthy (non-sprouted) corms was obtained after sorting corms in sand medium at 25°C till five months of storage i.e., May to September. In other media/conditions the deterioration in the corm status/health occurred after two or three months of storage and the corms were not suitable for cultivation. Thus, for the improvement in corm health, the dormancy of the corms of C*olchicum luteum* could be enhanced by five months. Good quality corms automatically ensure good health of the resultant plant.

157. **Punam, A., Sharma, S. & Singh, B. 2002.** "The medicinal wealth of Western Himalayan agro-ecological region of India: II. An inventory of shrubs". *Ann. Forest.* 10(1): 137–148.

Abstract: With the shift of society towards the use of traditional herbal medicine, many useful medicinal plants are on the verge of extinction. This paper documents the information on sixty shrubs of medicinal utility, prevalent in the Western Himalayan agro-eco region of India which will go a long way in planning their sustainable production, commercial utilization and conservation.

158. **Pusalkar, P.K. 2011.** "The C*orydalis nana* complex (Fumariaceae sect. Latiflorae) in Western Himalaya". *Kew Bull.* 66(4): 545–555.

Abstract: C*orydalis nana* Royle in the western Himalaya is found to be a complex of three species, including two hitherto undescribed. The true C. *nana* is a yellow-flowered species. The most common, greyish-blue or white-flowered species in the Sino-Indo-Nepal Himalaya, hitherto mistaken as C. *nana*, is a new species described here as C*orydalis magni*. An additional related species, C*orydalis devendrae*, characterised by tuberous roots and dorsally wingless/non crestate upper and lower petals is also described and illustrated from Uttarakhand state, India. A table comparing diagnostic characters, along with keys to taxa of the complex and a distribution map, are also included.

159. **Rana, D. & Kapoor, K.S. 2015.** "Assessment of floristic diversity of Shimla Water Catchment Sanctuary, Himachal Pradesh-India". *Indian Forester* 141(12): 1244–1247.

Abstract: Present study was carried out in Shimla Water Catchment Sanctuary of Himachal Pradesh to assess its floristic diversity. The sanctuary lies in between 31°05' to 31°75' N latitude and 77°12' to 77°15' E longitudes. Shimla water catchment area represents the only remaining undisturbed middle altitude forest in the lower ranges of the Western Himalayas and is the main water catchment area for Shimla. A total of 476 species of vascular plants were recorded. Of the total species, 39 species were trees, 81 shrubs, 320 herbs and the remaining 36 species were pteridophytes. Maximum species belonged to family Asteraceae (45 spp.); Lamiaceae (31 spp.) and Poaceae (30 spp.). 39 families were monotypic.

160. **Rana, J.C., Pradheep, K. & Verma, V.D. 2007.** "Naturally occurring wild relatives of temperate fruits in Western Himalayan region of India: An analysis". *Biodiv. & Conserv.* 16(14): 3963–3991.

Abstract: Wild relatives (WR) of temperate fruits belonging to genera viz., *Malus, Prunus, Pyrus, Vitis, Rubus, Fragaria* and others showed a wide range of diversity thereby possibility of utilizing large numbers of desirable genes/traits particularly the resistance to biotic and abiotic stresses which is generally lacking in their cultivated allies. About 55 WR of 23 temperate fruits, occurring in WH, including those naturalized, are discussed. Wild forms of crops such as Asiatic pear, apricot, Japanese plum, peach, walnut and pomegranate, blackberry, black and redcurrant existing in WH are also narrated. Wild relatives, their area of distribution, important traits, utilization potential and possible strategies for their effective conservation and utilization have been discussed.

161. **Rana, M.S. 2007.** *Assessment of Floristic Diversity and Conservation Prioritization of Communities for Conservation in Manali Wildlife Sanctuary of Himachal Pradesh in Northwestern Himalaya.* Ph.D. Thesis, Kumaun University, Nainital, India (Unpublished).

162. **Rana, M.S. & Samant, S.S. 2009.** "Prioritization of habitats and communities for conservation in the Himalyan Region: A state of the art approach from Manali Wildlife Sanctuary". *Curr. Sci.* 97(3): 326–335.

163. **Rana, M.S. & Samant, S.S. 2011.** "Population biology of *Lilium polyphyllum* D. Don ex Royle– A critically endangered medicinal plants in a protected area North Western Himalaya". *J. Nature Conserv.* 19: 137–142.

Abstract: *Lilium polyphyllum* D. Don ex Royle, a Critically Endangered medicinal plant of the Himalayan Region is exploited for its roots to meet the demand of pharmaceutical industries. Over exploitation from the natural habitats has caused population depletion to a great extent. Therefore, population status of *Lilium polyphyllum*, effect of soil factors and associated species, and methods to improve seed germination were investigated. Species were sampled in habitats, seeds were collected and subjected to various treatments viz., soaking, chilling, plant growth regulators (indol acetic acid, indol butyric acid and gibbrelic acid) and chemical compounds (potassium nitrate and sodium hypochlorite). *Lilium polyphyllum* was recorded in only two habitats between 2338 and 2574 m with density range of 1–6.7 plants/m^2. Density had significant correlations with soil moisture content.

164. **Rana, M.S., Rana, S.B. & Samant, S.S. 2012.** "Extraction, utilization pattern and prioritization of fuel resources for conservation in Manali Wildlife sanctuary, northwestern Himalaya". *J. Mountain Sci.* 9: 580–588.

Abstract: Fuelwood is the main source of the energy in mountainous regions. Hence, annual wood consumption is very high. Information on fuelwood resources, and their

extraction and availability is very scanty. Therefore, present study was carried out to study the diversity of fuelwood species, annual collection, preference and availability of fuel species in the forests. Thirty four species (25 trees and 9 shrubs) were extracted for fuel by the inhabitants. Total collection and species preference was highest for *Picea smithiana, Cedrus deodara, Indigofera heterantha, Pinus wallchiana* and *Sorbaria tomentosa*, respectively. Resource use index indicating use pressure was highest for *P. smithiana, C. deodara, I. heterantha* and *Abies pindrow*, respectively. Besides native species, some non-native horticultural and agroforestry species such as *Malus pumila, P. domestica, Celtis australis*, etc. were also being used as fuel. Preferred species showed their availability in eight forest types whereas, population and regeneration status was poor. Therefore, immediate actions are suggested to sustain current and future demand of fuelwood. The afforestation of degraded, uncultivated and marginal lands through high quality and preferred fuel species might reduce pressure on wild and selective species.

165. **Rana, M.S., Lal, M., Sharma, A. & Samant, S.S. 2008.** "Ecological evaluation of orchid diversity of Kullu district, Himachal Pradesh, India". *J. Orchid Soc. India* 22(1-2): 77–84.

Abstract: Twenty four species including 9 that are native and 5 endemic to the Himalayan region, were recorded from Kullu district. Majority of these species grow within an altitudinal range or 1800-2800 m. *Dactylorhiza hatagirea* and *Herminium monorchis* are high altitude species. Eight different orchid habitats were identified and soil profiles of major orchid habitats analyzed. While *Malaxis muscifera* exhibited avidity to a variety of habitat types, *Epipactis gigantea* and *Herminium lanceum* were habitat specific. Eight different orchid habitat types were identified and soil profiles of major orchid habitats analyzed. Due to high commercial values of *Dactylorhiza hatagirea* and *Malaxis muscifera* as medicine, these species are facing high anthropogenic pressure, leading to rapid population depletion in the area. Further, due to habitat degradation, the orchids growing in the shady moist habitats are facing high degree of threats. Therefore, adequate planning for the conservation of habitats of these orchids is suggested.

166. **Rana, R.S., Bhagat, R.M., Kalia, V., Lal, H. & Sen, V. 2013.** "Indigenous perceptions of climate change vis-a-vis mountain agricultural activities in Himachal Pradesh, India". *Indian J. Tradit. Knowl.* 12(4): 596–604.

Abstract: The study assesses the effects of climatic and socioeconomic changes on the livelihoods of rural agricultural communities in the Himachal Pradesh of India. The farmers' perceptions on locally idealized traditional weather cycles with climate change are analyzed and compared for different agro climatic zones of Himachal Pradesh. Climate change is described by farmers as temporal displacement of weather cycles,

reflecting changes in crop enterprises and livelihood options. Increasing temperature during summers, prolonged summers, delayed onset and uneven distribution of SW monsoon, delayed onset of winter, short winter periods, temperature above normal during winters, decreasing snowfall during winters, delayed snowfall and shorter winters, low temperature spells at high altitudes during winters and unpredictable rainfalls were the main experiences of the farmers regarding climate change across the elevation zones. Farmers' perceptions clearly indicated a shift in crop production in the low and mid hill regions, from crops requiring high moisture, like basmati rice and sugarcane, to those tolerating lower water like maize and local paddy rice. In addition, a shift of the apple growing belt to higher altitudes was noted, with former apple production areas replaced by vegetable crops. The study concludes that climate variability has a clear impact on crop productivity. In all elevations, farmers opined that a shift of labour earlier engaged in agriculture, to other enterprises is primarily due to handsome earnings in other enterprises, reflecting reduction in profits from agriculture and increase in vulnerability in climate dependent agricultural systems. Farmers in marginal areas are more vulnerable than small and large farmers from sub tropical climates in the mid hills to sub temperate climates at higher elevations.

167. **Rana, S.B. & Rana, M.S. 2015.** "Fuelwood resources along an altitudinal gradient in the central part of Himachal Pradesh, Northwestern Himalaya". *CPUH Res. J.* 3(2): 168–178.

Abstract: In the mountainous region, still fuelwood is main source of energy especially for cooking, room and water heating etc. Information on species wise extraction and availability of fuelwood species is feebly available. Therefore, present study carried out to study diversity of fuelwood species, annual collection, preference along altitudinal gradient and availability of fuel species in the unprotected forests. Total sixty six species (40 trees and 26 shrubs) were extracted for fuel by the local peoples. A total collection was highest in lower altitudinal zone 2000m). Preferred species showed their availability in fairly large numbers of forest types but the population and regeneration status was poor. Therefore, immediate actions are suggested to sustain current and future demand of fuelwood. The afforestation of degraded, uncultivated and marginal lands through high quality and preferred fuel species might reduce pressure on wild and selective species.

168. **Rana, S.B., Gupta, J.K. & Goyal, N.P. 1997.** "Survey of bee flora and beekeeping in Himachal Pradesh". *Indian Bee J.* 59: 144–149.

169. **Rani, S., Kumari, S., Gupta, R.C. & Chahota, R.K. 2014.** "Cytological studies of angiosperms (174 species) from district Kangra, Himachal Pradesh". *Pl. Syst. & Evol.* 300(5): 851–862.

Abstract: During the present study, 360 populations of 174 species belonging to 82 genera and 23 families of dicots have been cytologically worked out from different localities of district Kangra (Himachal Pradesh) between 550 and 3,800 m altitude. As many as 10 species including *Berberis ceratophylla* (2*n*= 28), *Caltha alba* (2*n*= 32), *Corydalis meifolia* (2*n*= 16), *C. thyrsiflora* (2*n*= 16), *Impatiens reidii* (2*n*= 14), *Indigofera hamiltonii* (2*n*= 16), *Potentilla thomsonii* (2*n*= 14), *Sedum trifidum* (2*n*= 36), *Stellaria semivestita* (2*n*= 26) and *Viola canescens* (2*n*= 12) have been cytologically worked out for the first time at world level. New intraspecific diploid cytotypes have been recorded in 11 species while new intraspecific tetraploid cytotypes are noticed in 15 species. B-chromosomes have also been reported in 3 species viz. *Anemone obtusiloba, Clematis grata* and *Ranunculus diffusus* for the first time at world level. The species of the area are active state of evolution, depicting heterogeneity in chromosome numbers involving polyploidy (48 species, 28.18 %) as well as irregular meiotic behaviour. The meiotic abnormalities have been witnessed in 69 species (39.65 %) showing different types of irregularities such as cytomixis, interbivalant connections, unoriented bivalents, chromatin stickiness, chromosomal laggards and bridges as well as abnormal microsprogenesis. All these meiotic abnormalities lead to reduced pollen fertility and formation of variable sized pollen grains in most of these species.

170. **Rattan, V. & Singh, O. 2009.** "Floristic diversity of woody perennials in Katola range of Mandi forest division (H.P.)". *Indian Forester* 135(12): 1696–1692.

Abstract: The floristic diversity of woody perennials was studied in Katola range of Mandi forest division in Himachal Pradesh. A total of 17 floral families contribute to the 27 species with 62.96% and 37.04% for tree and shrub species respectively. The dominant and co-dominant tree and shrub species was *Pinus roxburghii*, *Quercus leucotrichophora* and *Berberies aristata*, *Prinsepia utilis*, respectively. Distribution pattern of various tree species was contiguous except *Cedrus deodara*, *P. roxburghii* and *Myrica esculenta* which were random while distribution pattern of shrub species was contiguous except *B. aristata*. Such site-specific database is imperative as it can potentially provide fundamental information on the species organization, spatial heterogeneity, biotic and abiotic impacts on dynamics of regeneration and growth.

171. **Rau, M.A. 1960.** "On a collection of plants from Lahul". *Bull. Bot. Surv. India* 2(1-2): 45–56.

Abstract: The paper gives an account of the vegetation as observed by the author during a recent plant collection tour in the Chandra and Bhaga river valleys of Lahul (Kangra district, Panjab) beyond the Rohtang Pass. Plants were collected in the altitude range 3000 to 4000 metres and the paper includes a list of plants collected with brief descriptions, altitude of occurrences and uses, if any.

172. **Rawat, G.S. & Singh, S.K. 2006.** "Structure and composition of woody vegetation along the altitudinal and human use gradients in Great Himalayan National Park, north-western Himalaya". *Proc. Indian Natl. Sci. Acad.* 76B(2): 194–202.

Abstract: Structure and composition of woody vegetation along the gradients of altitude and human use were studied in the Great Himalayan National Park, North-Western Himalaya during 1997-1998. Objectives of the study were to characterize the broad physiognomic units in terms of community structure and composition along the altitudinal gradient and to assess the impacts of anthropogenic pressures on the vegetation. Owing to steep terrain and limited area accessible for the study, we used systematic sampling on either side of the existing trails which criss-crossed through various slopes. Circular plots 500 m^2 area (12.65 m radius) were used to quantify the tree layer and nested plots of 100 m^2 (5.65 m radias) area for the shrub layer. Woody communities have been classified using Two Way Indicator Species Analysis (TWINSPAN) that segregated 32 communities. Tree species density increased with increasing altitude (unlike other sites in Western Himalaya) while species diversity declined as reported elsewhere in the Himalayan region. Dominance, diversity, richness and evenness of woody species have been compared among various eco-climatic zones and suggestions for monitoring the vegetation have been given.

173. **Rawat, G.S. & Srivastava, S.K. 1986.** "Recently introduced exotics in the flora of Himachal Pradesh". *J. Econ. Taxon. Bot.* 8(1): 17–20.

Abstract: The distribution, family and native country of some widely spreading exotic species of Himachal Pradesh are given in the present paper. Taxa marked with asterisks are new records for Himachal Pradesh.

174. **Rawat, R.S. 2007.** "Potential ligneous flora of Himalayan cold desert with reference to Spiti valley of North West Himalayas". *J. Econ. Taxon. Bot.* 31(4): 942–947.

Abstract: The ligneous plants play a vital role directly as well indirectly in the day-to-day life of local habitants of the cold desert. They are low in occurrence and sparsely found and are under threat due to over exploitation by the locals for meeting their fuel and fodder requirements. Keeping in view, several surveys were conducted in Spiti valley of North-West Himalayas and collected 32 potential ligneous plant species, which are described here with recent botanical names, distribution and uses in cold desert areas of Spiti Valley (Himachal Pradesh). Documentation of ligneous plant species provides the base line information which will be helpful for planners, policy makers, researchers and foresters for devising suitable strategies for afforestation of low lying areas including riparian ecosystems of the Spiti valley.

175. **Rawat, R.S. 2009.** "Cultivation practices of some threatened medicinal plant species of Himachal Pradesh: A tool for conservation". *J. Non-Timber Forest Prod.* 16(3): 181–186.

Abstract: Himachal Pradesh is one of the Himalayan state, which is rich in medicinal and aromatic plant wealth. The rich medicinal and aromatic plants wealth is at present in great danger of depletion in the state. Therefore, development of cultivation practices of threatened medicinal and aromatic plant species can become an effective tool for their conservation. Keeping this in view, some threatened medicinal plant species of Himachal Pradesh are described in this paper with sequence of their recent botanical names, distribution, uses and cultivation practices.

176. **Rawat, R.S., Jishtu, V. & Kapoor, K.S. 2009.** "Assessment of floral diversity in *Salix fragilis* L. plantation in cold desert of Spiti Valley of North-west Himalayas". *Indian J. Forest.* 32(3): 343–348.

Abstract: Studies to assess the floral diversity in *Salix fragilis* L. plantation in cold desert of Spiti valley of North-West Himalayas was carried during August 2005. The plantation and control sites were surveyed for floristic composition, distribution pattern, species diversity and dominance. Maximum plant diversity was recorded in plantation site and minimum in control site. Majority of the plant species were contiguously distributed in both sites. In biological spectra hemicryptophytes dominate the plantation site whereas therophytes dominate the control site. The findings of the present investigation indicate that *Salix fragilis* plantation definitely improve the micro-habitat conditions under their canopy and accordingly enhance the floral diversity in plantation site. So afforestation of cold desert areas through site-specific tree species will help in enhancing the floral diversity of the area.

177. **Rawat, Y.S. & Vishvakarma, S.C.R. 2010.** "Diversity, distribution and utilization of fodder species in subtemperate, temperate and cold desert region of the Himachal Pradesh, North-western Himalaya". *J. American Sci.* 6(6): 72–81.

Abstract: Agriculture with animal husbandry is prevalent profession of rural people of Indian Himalayan Region. Livestock is considered one of the main sources of livelihood and integral part of livelihood, which rely mostly on fodder extracted from forests, grasslands, agriculture and agroforestry. The diversity, distribution and utilization pattern of the fodder species is important to prioritization of fodder species along an altitudinal gradient, and conservation and management practices of fodder species in both the Kullu and Lahaul valleys. Out of 67 fodder species, 43.28% were trees, 26.87% small trees and 29.85% shrubs, respectively. In general, maximum species were lopped annually, except *Olea ferruginea, Quercus floribunda,* Q. *leucotrichophora* and *Salix fragilis,* which were lopped an interval of 3 years. Majority of the fodder species are used as multipurpose and contributed to the high socio-economic values.

178. **Rawat, Y.S., Oinam, S.S., Vishvakarma, S.C.R. & Kuniyal, J.C. 2004.** "*Saussurea costus* (Falc.) Lipsch.: A promising medicinal crop under cold desert agroecosystem in North Western Himalaya". *Indian J. Forest.* 27(3): 297–303.

Abstract: The present study was conducted in the cold desert region of Lahaul valley in Himachal Pradesh. *Saussurea costus* (Falc.) Lipsch. an endangered medicinal herb was studied in terms of its distribution pattern, cultivation practices and problems in cultivation. Seed germination showed better results in hot chamber in the month of May, June and July. Seeds sown in hot chamber at 30°C showed better germination (99±1.33%) in the month of June in comparison with cold chamber at 20°C. Energy and monetary efficiencies revealed output/input ratio of 7.5 and 0.8, respectively. Introducing of seasonal cash crop like Pea, Potato and Hop, need for a mandatory permit for cultivation and export, longer cultivation cycle (3 years), lower and continuously fluctuating market rates were found to be the main causes of discarding *kuth* cultivation in the valley. The possibilities for its revival and popularising *kuth* cultivation have been discussed in the present study.

179. **Rawat, Y.S., Oinam, S.S., Vishvakarma, S.C.R., Kuniyal, C.P. & Kuniyal, J.C. 2006.** "Willow (*Salix fragilis* Linn.): A multipurpose tree species under pest attack in the cold desert of Lahaul valley, North Western Himalaya". *Ambio* 35(1): 43–48.

Abstract: *Salix fragilis* is the most common willow species grown extensively under the indigenous agroforestry system in the cold desert of Lahaul valley located in the northwestern Himalayas, India. Presently, this tree is under severe pest attack, and other infections have made its survival in the area questionable. This deciduous multipurpose tree species provides vegetation cover to the barren landscape of Lahaul and is a significant contributor of fuel and fodder to the region. This study is a detailed profile of the plant in three villages within this region: Khoksar, Jahlma, and Hinsa. The willow provided 69.5%, 29%, and 42% of the total fuelwood requirements of Jahlma, Khoksar, and Hinsa respectively. A striking observation was that only 30.0 ± 20.1% trees were healthy: 55.2 ± 16.1% of the willows have dried up and 14.8 ± 6.1% were in drying condition due to a combination of pest infestation and infection. To sustain this cultivation of willow under the existing agroforestry system in the region, we recommend that locally available wild species and other established varieties of willow growing in similar regions of the Himalayas be introduced on a trial basis.

180. **Richa, Sharma, M.L. & Sharma, N.K. 2012.** "Bamboo of Himachal Pradesh". *Indian Forester* 138(12): 1141–1145.

Abstract: Himachal Pradesh is blessed with extraordinary vegetation and floral assemblages, which can be attributed to the wide altitudinal range coupled with local variations in edaphic and climatic factors. Eight species belonging to 5 genera of bamboo

are distributed in the state, occupying an area of 60 sq km. This paper presents a brief account of these bamboos together with a key to their identifications in the field.

181. **Sachan, R.S., Sharma, R.B. & Chibber, R.K. 1981.** "Nature and status of organic matter of some hill and forest soils of Himachal Pradesh". *Indian J. Forest*. 4(4): 249–252.

Abstract: The organic matter of some hill and forest soils having different types of plant cover was characterised in terms of its quantity and distribution in the soil and composition of its various fractions. Three forest types, viz., (i) Pine, (ii) Ban, Moru oak and Pine and (iii) Kharsu oak forests and one hill soil with natural grass as plant cover were taken up in the study. The average annual rainfall for the four sites varied from 150 to 175 cm. The altitude varied from 4700 to 9500 meters above the mean sea level. It has been found that the forest soils have the bulk of their organic matter close to the soil surface as against the grassland where the considerable proportion is found in the lower layers. The ethanol-benzene extractable fraction constituted 9.12, 12.06, 7.62 and 27.30 per cent of the total humus in soils under grasslands, pine, ban and moru oak and pine, and kharsu oak, respectively. The proportion of humic acids in the composition of humus decreased with altitudes and increased along the depth in the same profile. More than fifty per cent of humic acids were combined with exchangeable Ca and Mg except in acidic Kharsu oak forest where this value was only 38.46 per cent. Rest of the humus was either moble, bound to stable hydrates of iron and aluminium, or present in unhydrolysable form called humins.

182. **Sahni, B. 1927.** "A note on the floating Island and vegetation of Khajiar, near Chamba in N.W. Himalaya". *J. Indian Bot. Soc.* 6:1–7.

183. **Samant, S.S. 2002.** "Diversity, distribution and conservation of orchids of Trans-, North-West and West-Himalaya". *J. Orchid Soc. India* 16(1-2): 65–75.

Abstract: The Indian Himalayan region comprises Trans-, North-West, West, Central, and East Himalayan biogeographic provinces and includes parts of Jammu & Kashmir, Himachal Pradesh, Uttaranchal (Garhwal and Kumaun), Sikkim, West Bengal and Arunachal Pradesh states. The region is supposed to be one of the repositories of orchids and East Himalaya (i.e., Arunachal Pradesh) alone harbours 545 species. In view of the conservation and socio-economic (aesthetic, medicinal and economic) values of orchids, an attempt has been made here to: (i) study the diversity and distribution patterns; (ii) identify nativity, endemism and rarity; (iii) identify the socio-economic values; and (iv) suggest appropriate strategy for the conservation and management of orchids of Trans-, North-West and West Himalaya. A total of 244 species of orchids belonging to 5 sub-families and 72 genera have been reported. Of these about 97 species are epiphytic in nature. Among the sub-families,

Epidendroideae (19 genera and 91 species) showed the richness in species, followed by Orchidioideae (16 genera and 58 species) and Vandoideae (21 genera and 50 species), respectively. *Habenaria* (17 spp.), *Dendrobium* (15 spp.), *Bulbophyllum* (11 spp.), *Liparis, Oberonia, Peristylus* (10 spp., each), *Eria, Eulophia* (9 spp., each), *Cymbidium, Herminium, Calanthe* (8 spp., each), *Malaxis, Nervilia* (7 spp., each), *Goodyera* (6 spp.), *Vanda, Coelogyne, Listera* and *Neottia* (5 spp., each) are among the species rich genera, respectively. Thirty one genera are monotypic ones indicating their narrow genetic base in the area. The highest number of species i.e., 211 are distributed in the altitude zone, < 1800 m, followed by the zone, 1801- 2800 m (i.e., 103 species). 155 species are native to the Himalayan region and 13 species are native to Himalayan region and adjacent countries, together. Of the native species, 19 species [*Nervilia mackinnonii* (Duthie) Schltr., *Herminium kumaonensis* Deva & Naithani, *Peristylus duthiei* (Hook.f.) var. *inayatii* Deva & Naithani, *P. kumaonensis* Renz, *P. fallax* Lindl . var. *dwarikaii* Deva & Naithani, *Dendrobium normale* Falc., *Eria occidentalis* Seidenf., *Flickingeria hesperis* Seidenf., *Ponerorchis nana* (Schltr.) So, *P. renzii* Deva & Naithani, *Aphyllorchis gollani* Duthie, *Epipogium tuberosum* Duthie, *Didiciea cunninghamii* King & Prain ex King & Pantl., *Listera longicaulis* King & Pantl., *L. nandadeviensis* Hajra, *Neottia kashmiriana* (Duthie) Beauv., *N. mackinnonii* (Deva & Naithani) Schltr., *N. microglottis* (Duthie) Schltr. and *Zeuxine seidenfadenii* Deva & Naithani] are endemic to Indian Himalayan Region where as 63 species are near endemic which extend to adjacent States/Countries. Fifteen species [*Calanthe alpina* Lindl., *C. mannii* J.D. Hook, *C. pachystalix* Reichb. f. & J.D. Hook, *Cypripedium cordigerum* D. Don, *C. elegans* Reichb. f., *C. himalaicum* Rolfe ex Hemsl., *Cymbidium hookerianum* Reichb.f., *Diplomeris hirsuta* (Lindl.) Lindl., *Eria occidentalis* Seidenf., *Flickingeria hesperis* Seidenf., *Neottia inayatii* (Duthie) Beauv., *N. microglottis* (Duthie) Schltr., *Eulophia mackinnonii* Duthie, *Aphyllorchis gollanii* Duthie and *A. parviflora* King & Pantl.] have been recorded in the Red Data Book of Indian Plants. Some of the species have medicinal and horticultural values. Population assessment of native, endemic and rare-endangered species, identification of host range of epiphytes, identification of Pressure Use Index (PUI) and Sensitivity Index (SI) of host plants, establishment of orchid reserves in the orchid rich areas, promotion of propagation by conventional and *in vitro* methods, and involvement of inhabitants in the conservation and management of orchids have been suggested.

184. **Samant, S.S., Butola, J.S. & Sharma, A. 2007.** "Assessment of diversity, distribution, conservation status and preparation of management plan for medicinal plants in the catchment area of Parbati Hydroelectric Project stage- III in Northwestern Himalaya". *J. Mountain Sci.* 4(1): 34–56.

Abstract: The developmental activities, particularly the construction of hydroelectric projects are causing a great loss of biodiversity in the Indian Himalayan Region. The

Himachal Pradesh, a part of IHR is well known for the development of hydroelectric projects. The Parbati H.E. Project is amongst the major projects of the State. The different stages of the project are all causing loss of biodiversity of the area. Stage III of the Parbati H.E. Project is a run of the river scheme on the Sainj River downstream of Power House of Parbati H.E. Project Stage II. The project shall utilize regulated discharge of Parbati H.E. Project Stage II and inflow of River Sainj for power generation, and has been contemplated as a peaking station operating in tandem with Stage II. The present study has been undertaken to see the impact of hydroelectric project on the biodiversity, particularly on medicinal plants. A total of 104 species of medicinal plants, belonging to different life forms, i.e., trees (23 spp.), shrubs (22 spp.), herbs (57 spp.) and ferns (2 spp.) were recorded. The species have been analyzed and studied for their distribution, classification, altitudinal zones, part (s) used, indigenous uses, nativity, endemism and rarity. Different parts of these species, such as whole plants, roots (including rhizomes and tubers), leaves, flowers, fruits, seeds, stems, barks, spikes, nuts and insect galls are used by the inhabitants for curing various diseases and ailments. 30 species are native to the Himalayan region, 9 species native to the Himalayan region and adjacent countries also and 65 species are non-natives. 9 species are near endemics. Considering the whole Himalaya as a biogeographic unit (*sensu lato*), the near endemics are endemic to the Himalaya. Among these species, *Zanthoxylum armatum* is categorized as endangered and *Valeriana wallichii* as vulnerable. *Hedychium spicatum, Rhus javanica, Berberis lycium, Thalictrum foliolossum, Salvia lanata, Rubia cordifolia* and *Bergenia ligulata* may be considered as threatened species due to their over exploitation for trade. 90 species are propagated by seeds, 8 species by seeds and rhizomes/roots/tubers, 4 species by seeds and cuttings, and 2 species by sori. A management plan for the cultivation and conservation of the medicinal plants in the dam submergence area, and the commercially viable medicinal plants with high value in the catchment area is suggested.

185. **Samant, S.S., Singh, M., Lal, M. & Pant, S. 2007.** "Diversity, distribution and prioritization of fodder species for conservation in Kullu district, Northwestern Himalaya, India". *J. Mountain Sci.* 4(3): 259–274.

Abstract: In the Indian Himalayan Region predominantly rural in character, livestock is one of the main sources of livelihood and integral part of the economy. Livestock mostly rely on fodder from wild. The diversity, distribution, utilization pattern, nativity, endemism, rarity, seasonality of availability, nutritive values, perceived economic values and pressure use index of livestock have not been studied. The present study attempts to enumerate 150 species of fodder representing trees (51 spp.), shrubs (54 spp.) and herbs (45 spp.). Poaceae (19 spp.) and Fabaceae (13 spp.) amongst families and *Salix* (6 spp.), *Ficus, Clematis*, and *Desmodium* (5 spp., each) amongst genera are

rich in species. Maximum species were found in the 1801–2600 m zone, and the remaining two zones showed relatively low diversity. Out of the 150 species, 109 are used in summer, 5 winter and 36 throughout year. During rainy season, mostly grasses are used as fodder. Only 83 species are native to the Himalayan region, one species, *Strobilanthus atropuroureus* is endemic and 35 species are near endemic. The nutritive values of the fodder species were reviewed, and economic values and status of the species were also assessed. The pressure use index of the species was calculated on the basis of cumulative values of the utilization pattern, altitudinal distribution, availability, status, nativity and endemism. Amongst the species, *Grewia oppositifoilia, Morus serrata, Indigofera heterantha, Quercus leucotrichphora, Ulmus villosa, U. wallichiana* and *Aesculus indica* showed highest PUI indicating high preference and pressure. Season wise prioritization of the species for different altitudinal zones has been done. Appropriate strategy and action plan have been suggested for the conservation and management of fodder species.

186. **Samant, S.S., Kumari, P., Puri, S., Singh, A. & Rathore, S. 2019.** "Diversity, indigenous uses and traditional practices of dye yielding plants in central Himachal Pradesh, north Western Himalaya". *Indian J. Tradit. Knowl.* 18(3): 560–564.

Abstract: The present paper is an attempt to assess the diversity and document the indigenous uses and traditional practices of dye yielding plants in Central Himachal Pradesh North Western Himalaya. A total of 17 species of dye yielding plants belonging to 13 families and 17 genera were recorded. These species are used to dyeing clothes and other items. Different plant parts were utilized, of which fruit (7 spp.) was used in the majority, followed by flowers (5 spp.); bark (4 spp.) and leaves (3 spp.) Information on indigenous uses and traditional practices was documented with the help of local inhabitants. Natural dye yielding plants have immense significance in the socio-economic and socio-cultural aspects of the inhabitants. The indigenous knowledge of extractions, processing and practices of *in situ* and *ex situ* conservation of the species; natural dyes has declined to a great extent. Therefore, to maintain dye yielding plant wealth, awareness among the inhabitants; involvement of local inhabitants and Forest Department about the indigenous uses and traditional practices have been suggested.

187. **Sankhyan, H.P., Kairon, V.K. & Singh, N.B. 2014.** "Morphometric variability in soapnut (*Sapindus mukorossii*) in Himachal Pradesh". *J. Non-Timber Forest Prod.* 21(2): 85–92.

Abstract: In order to select better seed sources for improved genetic gain and quality production of *Sapindus mukorossi* (Ritha) twenty four seed sources and two D.B.H. classes from Himachal Pradesh were evaluated for fruits and seeds morphometric traits. The study revealed significant variation among different seed sources for all traits. Over all Banjar seed source was found to be superior followed by Garsa seed

source for all morphometric traits. All traits found genetically controlled as revealed by high heritabilities.

188. **Sankhyan, H.P., Sehgal, R.N. & Bhrot, N.P. 2004.** "Morphological characters variation in different species of Seabuckthorn in cold desert of Himachal Pradesh". *Indian J. Forest.* 27(2): 129–132.

Abstract: The present investigation was carried out to study the variation in morphological characters in different species of Seabuckthorn in cold deserts of Himachal Pradesh. Different species showed variation w.r.t. branch, leaf, thron and fruit characters under natural conditions. As regards the variation with age in both the species, it was reported that branch, leaf and fruit characters showed increasing trend up to the age of 9-years thereafter it start declining. In general, it is suggested that 9-year age is the best for harvesting the fruits in both the species where all the characters showed maximum value.

189. **Sankhyan, H.P., Sehgal, R.N. & Bhrot, N.P. 2005.** "Standardization of pres owing treatments for different Seabuckthorn species in Cold Deserts of Himachal Pradesh". *Indian Forester* 131(7): 931–938.

Abstract: Seabuckthorn is a wonderful plant for the afforestation and ecological rejuvenation of the cold desert areas of Himalayas where plantations of poplars, willows and Robinia have not given very encouraging results. It has the potential to economically transform these harsh and marginal areas plagued by low productivity. Keeping in view, almost complete lack of information in India on regeneration through seed the present investigation was carried out to standardize various presowing treatments in two species of Sea buckthorn in the cold desert of Himachal Pradesh. Different presowing treatments were hot water (80DC for 10 minutes), conc. H_2S0_4 (20 minutes), cold water for 2, 4 and 6 days, cow dung heap for 2 days and control. In case of *Hippophae rhamnoides*, the best presowing treatment was found to be cold water soaking for 6 days which resulted in the highest germination per cent (93.33), per cent survival (73.33), growth index (69.78) and SVI (8502.36). However, for *H. salicifolia* soaking treatment in hot water at 80DC for 10 minutes was found to be the best and resulted in the highest germination per cent (76.66), per cent survival (60.00), shoot length (45.6 cm), root length (70.9 cm), growth index (39.90) and SVI (8930.89) and ranked first.

190. **Sankhyan, H.P., Thakur, Sanjeev & Sharma, S.S. 2018.** "Identification of discriminating morphological descriptors for characterization of Seabuckthorn (*Hippophae rhamnoides* L.) germplasm in Himachal Pradesh". *J. Non-Timber Forest Prod.* 25(1): 51–55.

Abstract: Identification of discriminating morphological descriptors for characterization of Seabuckthorn (*Hippophae rhamnoides* L.) germplasm in Himachal Pradesh was

undertaken in ten different major gene pool areas of Seabuckthorn in Spiti valley, where 80 per cent population is of *Hippophae rhamnoides* L. Twenty plants of each gene pool area were selected during the end of growing season. Plant shoot, leaf blade, pubescent and fruit characteristics were recorded. Twenty two morphological traits were recorded for vegetative and reproductive descriptors, which are comprised of qualitative and quantitative characteristics. Study concluded with preparation of DUS (Distinctiveness, Uniformity and Stability) guidelines for developing a new species/ subspecies or variety or new clone which will help in further breeding and genetic improvement programme. The present study identifies the morphological descriptors that are most relevant for characterisation of Seabuckthorn (*Hippophae rhamnoides* L.) in cold desert ecosystem of Himachal Pradesh.

191. **Sankhyan, H.P., Bawa, R., Gupta, Tanvi & Singh, N.B. 2013.** "Variation in leaf characteristics of *Anogeissus latifolia* Roxb. ex DC. in Himachal Pradesh". *Indian J. Forset*. 36(2): 181–185.

Abstract: Variation studies in leaf characteristics of *Anogeissus latifolia* in Himachal Pradesh was undertaken in four districts namely Solan, Sirmour, Kangra and Una considering three different diameter classes (10-20, 20-30 and 30-40 cm) in eight sites with three replications. Sites S4 (Chaaban-Sirmour) and S7 (Jachh-Kangra) showed best results for variation for leaf traits of this species and diameter class 30 to 40 cm proved best over other diameter classes and thus recommended for morphogenetic variation in its leaf traits. Promotion of multipurpose tree like *Anogeissus latifolia* will go a long way in mitigating the fuel and fodder requirements of the people of hilly state.

192. **Santvan, V.K. 1993.** *Ecological studies on alpine vegetation near Rahla, Kullu, Himachal Pradesh*. Ph.D. Thesis, Himachal Pradesh University, Summer Hill, Shimla (H.P.) (Unpublished).

193. **Santvan, V.K., Nigam, A. & Thakur, M. 2012.** "Status and use of tree flora of Darlaghat Wildlife Sanctuary, Solan (H.P.)". *Indian Forester* 138(10): 958–960.

Abstract: Present study revealed that 60 tree species were used for various purposes which include house construction, furniture, agricultural implements; for making walking sticks, musical instruments, packing cases, etc. The predominant families are Fabaceae with 11 species (8 genera), Pinaceae with 5 species (3 genera), Salicaceae with 4 species (2 genera). However, Bambuaceae (3 genera), Euphorbiaceae (3 genera) and Fagaceae (2 genera) have 3 species each. Among various plants, 18 plants are predominantly used for house construction, 14 for agricultural implements, 8 for agriculture and furniture manufacturing, 7 for agriculture and house construction, 4 plants are exclusively used only for furniture, 2 for musical instruments and packing cases each and 3 for making walking sticks.

194. **Sarin, Y.K. 1967.** "A survey of vegetable raw material resources of Lahul". *Indian Forester* 93(7): 489.

Abstract: A survey of medicinal, aromatic and economic plant materials occurring in the Lahul region of Himachal Pradesh was conducted to find out the possibilities for industrial exploitation. The paper deals with the availability, market position, cultivation and other aspects of 13 of such materials which can be exploited immediately. Availability and uses of 24 other vegetable materials of minor importance have also been discussed.

195. **Saxena, A.K. & Soni, P. 2010.** "Floral diversity and composition in a chronosequence of restored limestone mines of Sirmour district, Himachal Pradesh (India)". *Ann. Forest.* 18(1): 1–14.

Abstract: Vegetation composition and diversity were studied in the reclaimed limestone mines in Sirmour district of Himachal Pradesh, India. A chronosequence of four reclaimed sites and an adjoining stand of natural forest were selected and periodical phytosociological studies were undertaken. Importance Value Index, Sorenson's Index, Shannon-Wiener Index, Hill's Diversity Indices, Simpson's Index, Evenness Index, Equitability Index of Pielou and â-diversity Index for the area were calculated. D-D curves were plotted for various sites. Results indicate the species richness increased with the age of reclamation. A process of ecological succession was seen to occur with invasion of species of higher successional order into the denuded sites.

196. **Sehgal, Anju Batta. 2016.** "Hidden nutrients of some wild fruits and leaves of Hamirpur district of Himachal Pradesh". *Phytotaxonomy* 16: 138–142.

Abstract: Wild edible plants (herbs, shrubs, trees and climbers) by virtue of their possessing great variety and fascinating foliage have drawn attention and admiration of travellers and biologists for centuries. They are represented by 15,000 species out of the total 4,22,000 flowering plants reported from the world, representing 3.56% of the global flora. Wild edibles are getting more importance as a source of carbohydrates, proteins, fats, iron, calcium, magnesium, sodium and other minerals. Some of the wild edibles of Hamirpur District deserve special attention as the wild plants of this area are continuously being used by the indigenous people. Adherence to traditional way is a virtue still owned by tribal and ethnic societies. Biochemical analysis of a few wild edible fruits and fodder leaves has shown remarkable results. Fodder or animal feed is any agricultural foodstuff used specifically to feed domesticated livestock, such as cattle, goats, sheep, horses, chickens and pigs. Most animal feed is from plants. Livestock provides draught power, rural transport, manure, fuel, milk and meat. Most often, livestock is the only source of cash income for subsistence farms and also serves as insurance in the event of crop failure. At present, the country faces a net deficit of 61.1 % green fodder, 21.9% dry crop residues and

64% feeds. India supports nearly 20% of the world livestock and 16.8% human population on a land area of only 2.3%. It has world's 16% cattle and 55% buffalo population, second largest goat (20%) and fourth largest sheep (5%) population in the world.

197. **Sehgal, Anju Batta & Sood, S.K. 2013.** "Some important supplementary food plants and wild edible plants of district Hamirpur (Himachal Pradesh), India". *Phytotaxonomy* 13: 96–105.

Abstract: Wild edibles (herbs, shrubs, trees and climbers) by virtue of their possessing great variety and fascinating foliage have drawn attention and admiration of travellers and biologists for centuries. They are represented by 15,000 species out of the total 4,22,000 flowering plants reported from the world, representing 3.56% of the global flora. Wild edibles are getting more importance as a source of carbohydrates, starch, proteins, fats, Iron, calcium, magnesium, sodium and other minerals. Some of the wild edibles of Hamirpur district deserve special reference as this district has vast climatic variations ranging from 0-4°C to 42-44°C, altitude 400-1232 m and a population of 4,54,293 people (2011 census). Wild plants of this area are continuously being used by the indigenous people. Adherence to traditional way is a virtue still owned by tribal and ethnic societies. This article discusses some of the wild edible plants of district Hamirpur, method of their usage and objective behind their use. Biochemical analysis of the few wild edibles showed remarkable and surprising results.

198. **Sen, Tara, Samant, S.S., Sharma, A. & Tiwari, L.M. 2013.** "Diversity, endemism and economic potential of wild edible plants in Rissa Khad watershed of district Mandi, Himachal Pradesh". *J. Non-Timber Forest Prod.* 20(2): 155–164.

Abstract: Study was conducted in Rissa Khad watershed of district Mandi, Himachal Pradesh to assess the diversity, endemism and economic potential of wild edible plants. A total of 237 wild edible plants belonging to 119 genera and 94 families were recorded. The species were also analysed for nutritional and medicinal values to find out economical potential.

199. **Seth, M.K. & Jaswal, S. 2004.** *An Enumeration of Plant Resources of Shimla (Himachal Pradesh) in the Northwestern Himalayas*. International Book Distributors & Publishers, Dehra Dun.

200. **Seth, M.K. & Seth, Amit. 2003.** "Early plant collectors of Himachal Pradesh from 1817 to 1984". *Phytotaxonomy* 3: 79–96.

Abstract: Himachal Pradesh state falls in the Western Himalayan biotic province within the Sino-Himalayan subzone between 75°-79° N longitude and 28°-33° E latitude. Physiographically, the southern region is as hot as the plains of Punjab in the west, where as the northern region has a temperature summer and winter with extreme cold and heavy snowfall. The unique nature of the flora of Himachal Pradesh has

attracted numerous botanists since 1817, when William Spencer Webb visited Sabathu and William Moorcroft visited Kangra, Kullu and Lahaul in 1819. The contributions of early plant collectors of Himachal Pradesh are reviewed in this paper.

201. **Sharma, A. 2008.** *Studies on Floristic Diversity and Prioritization of Communities for Conservation in Hirb and Shoja Catchments, District Kullu of Himachal Pradesh, North Western Himalaya.* Ph.D. Thesis, Kumaun University, Nainital, India (Unpublished)

202. **Sharma, A., Samant, S.S., Bhandari, S. & Butola, J.S. 2017.** "Diversity, distribution and conservation of orchids along an altitudinal gradient in Himachal Pradesh, North Western Himalaya". *J. Orchid Soc. India* 31(1-2): 23–32.

Abstract: Orchids comprise one of the largest families of flowering plants and cover 6.8% of the flowering plants in India. They are prized for their incredible diversity in size, shape, forms colour, attractiveness of their flowers and high keeping qualities upto 10 weeks. While exploring the floristic diversity of the biodiversity rich areas of the Himachal Pradesh, an attempt was made to assess the diversity, distribution and conservation status of the orchids along an altitudinal gradient in Hirb and Shoja catchments in Kullu district, Chailchowk-Rohanda-Kamrunag area and Mandi-Pandoh area in Mandi district and Ghanahatti-Shimla area in Shimla district. Extensive and intensive field surveys revealed the occurrence of 29 species of orchids, mostly terrestrial belonging to 16 genera. Amongst genera, *Habenaria* (8 spp.), *Goodyera* (3 spp.), *Calanthe, Epipactis, Herminium, Listera* and *Malaxis* (2 spp. each) were dominant. Majority of species (25) were distributed between 1800–2800 m altitudes, whereas at elevations higher and lower than these, relatively less diversity of orchids were recorded. Amongst the different sites, Chailchowk-Rohanda-Kamrunag area (19 spp.) represented maximum species or orchids, followed by Hirb and Shoja catchments (12 spp.), Ghanahatti-Shimla area (7 spp.) and Mandi-Pandoh area (5 spp.). Fifteen species were native to the Himalayan region and 7 species were near endemic to the Indian Himalayan Region. One species *(Dactylorhiza hatagirea*) was identified as critically endangered and 6 species as endangered and 11 as vulnerable. The over exploitation of orchids for trade, habitat loss and climate change are major factors leading to rapid decrease in their population. These factors have led to habitat destruction, changes and fragmentation. Therefore, assessment of the habitats and populations of the orchids is essentially required to understand the dynamics of the habitats and status of the species which would help in developing appropriate strategy for *in situ* conservation of the orchids in Himachal Pradesh.

203. **Sharma, J.R., Singh, S. & Uniyal, B.P. 2005.** "Plant diversity in Siwalik Himalaya". *Indian J. Forest.* 28(3): 321–337.

Abstract: In the present communication, an attempt has been made to put together an analytical compilation of the existing data and the information collected by the authors

during plant survey and explorations of the region. Besides, the report also embodies the data gathered during special survey conducted by BSI and other sister organization under various projects on studies of plant diversity in the Siwalik ecosystem of concerned states. The report may serve as a point of reference for all ongoing and future plant based developmental activities as well as promotion of sustainable socio-economic development of the region. 42 species belonging to 23 genera under 20 families of fern and fern-allies, 3 species under 3 genera within 2 families of gymnosperms and 975 species of angiosperms belonging to 590 genera under 124 families have been reported from this area.

204. **Sharma, L., Samant, S.S., Kumar, A., Lal, M., Devi, K. & Tewari, L.M. 2018.** "Diversity, distribution pattern, endemism and indigenous uses of wild edible plants in Cold Desert Biosphere Reserve of Indian Trans Himalaya". *Indian J. Tradit. Knowl.* 17(1): 122–131.

Abstract: Wild edible plants form an important source as a supplement/substitute food in times of scarcity for native communities. Use of wild plants as a food source is an integral part of the culture of tribal people. Therefore, the present study has been conducted in Cold Desert Biosphere Reserve (CDBR) of Trans Himalaya to; (i) assess the diversity and distribution pattern of wild edible plants; (ii) analyze for nativity and endemism; (iii) assess the indigenous uses and traditional practices; (iv) document the nutritional content of selected wild edible plants; and (v) suggest suitable management options. Total 91 wild edible plants, representing 64 genera and 31 families were recorded. Of these, 35 species were native, 02 species endemic and 19 species were near endemic. Various plant parts such as leaves (46 spp.), stems/ shoots (18 spp.), fruits (17 spp.), etc., were eaten raw, roasted, boiled and cooked. The nutritional value of some of the wild edibles competes with the cultivated crops and vegetables. Therefore, to ensure the food security in the remote areas, there is a need to assess the populations of these species using quadrate method; develop conventional and *in vitro* propagation protocols for mass multiplication and their conservation in the *in situ* and *ex situ* conditions; and create awareness among the local inhabitants about the food value of these plants.

205. **Sharma, M. & Dhaliwal, D.S. 1997.** "Biological spectrum of the flora of Kullu district (Himachal Pradesh)". *J. Indian Bot. Soc.* 76: 283–284.

206. **Sharma, M. & Singh, H. 1990.** "Observations on floristic composition of Chamba district, Himachal Pradesh". *New Botanist* 17: 273–281.

207. **Sharma, M. & Singh, H. 1994.** Observations on the herbaceous vegetation of Chamba district. In: Sharma, T.A., Saini, S.S., Trivedi, M.L. & Sharma, M. (Eds.), *Current Researches in Plant Sciences*. Bishen Singh Mahendra Pal Singh, Dehra Dun, Pp. 147–153.

208. **Sharma, M. & Singh, H. 1995.** Life-forms and biological spectrum of the flora of Chamba district (Himachal Pradesh). In: Pandey, A.K. (Ed.), *Taxonomy and Biodiversity*. CBS Publishers, New Delhi, Pp. 81–86.

209. **Sharma, M. & Singh, H. 1996.** "Additions to the flora of Himachal Pradesh, North-West Himalaya". *Bull. Bot. Surv. India* 38(1-4): 38–42.

Abstract: Botanical explorations were made in Chamba district of Himachal Pradesh from 1984-1988 under "BSI District Flora Project" sponsored by Botanical Survey of India. Consequently, studies on phytogeography (Singh & Sharma 1989, Sharma & Singh 1990 a), floristic composition (Sharma & Singh 1990 b), herbaceous vegetation (Sharma & Singh 1994) and biological spectrum (Sharma & Singh 1995) of the district have been published. Occurrence of *Gnaphalium coarctatum* Willd.- A South American taxon naturalized in India, has recently been reported for the first time from the district (Singh & Sharma 1988). In continuation, following 28 taxa are being reported as the new plant reports for Himachal Pradesh. These have not been included earlier in their comprehensive three volume compilation entitled 'Flora of Himachal Pradesh, Analysis' by Chowdhery & Wadhwa (1984) or by the subsequent 30 authors (see under references) who have contributed additional plant reports to this work. The arrangement of the families is as in Hooker (1872-1897). All the specimens are preserved in Herbarium, Punjabi University, Patiala (PUN).

210. **Sharma, M. & Singh, H. 1996.** "Phytogeographic observations on the flora of Chamba district (Himahal Pradesh) Part –II". *Neo Botanica* 23: 103–112.

Abstract: The aim of the present study is to document ethno-botanical bio-diversity of Parbati Valley in Kullu district of Himachal Pradesh, interdependence of local communities with these resources and impact of Parbati Hydroelectric Project stage-II on both. The Parbati H.E. Project stage-II is a run of the river scheme proposed to harness hydro potential of lower reaches of the river Parbati with an installed capacity of 800 MW. The Parbati H.E. Project is part of the 2013 MW Parbati project, Asia's biggest hydroelectric power project on Parbati river. During field trips to the study area between September 2017 and October 2018, a total of 218 plant species were inventoried belonging to 178 genera and 74 families used by the indigenous communities for life sustenance. Out of these, there are 166 medicinal plant species, consisting of 94 herbs, 47 shrubs and 25trees, which are used by local people for treatment of various diseases and ailments. During survey, plants species like *Arnebia euchroma, Aconitum chasmanthum, Ajuga bracteosa, Dactylorhiza hatagirea, Picorhiza kurrooa and Atropa acuminate, Aconitum heterophyllum, Arnebia benthami, Fritillaria roylei, Angelica glauca* have been found to be critically endangered due to construction of hydro-electric dam and allied activities. A perception survey was conducted in five sample adjoining villages namely Tosh, Tulga, Pulga, Sheela and Nakhtan with a

population of 1826 villagers from 414 households to ascertain the impact of Parbati H.E. Project on their lives and biodiversity.

211. **Sharma, M. & Singh, H. 1997.** Observations on the herbaceous vegetation of Chamba district. In: Sarma, T.A., Saini, S.S., Trivedi, M.L. & Sharma, M. (Eds.), *Current Researches in Plant Sciences*. Vol. I-II. Bishen Singh Mahendra Pal Singh, Dehra Dun. Pp. 147–153.

212. **Sharma, M.V. 2018.** "Inventorization of non-timber forest products and their valuation in district Hamirpur (H.P.)". *CPUH Res. J.* 3(2): 163–167.

Abstract: Non Timber Forest Products play an important role as traditional source of food, medicines, fibre and fodder, etc. In some areas, they are also the source of cash income to the people. These products are minor, alternative and secondary which are obtained from the plants which are not timber yielding. A non timber forest products survey was conducted in Hamirpur district of Himachal Pradesh during 2017. A total of 15 plants belonging to 13 genera and 13 families were reported. The forest dwellers are progressively dependent on NTFPs for sustaining their daily livelihood instead of utilizing it as a prospective income source for their socio-economic development.

213. **Sharma, N. & Kala, C.P. 2016.** "Utilization pattern, population density and supply of *Rhododendron arboretum* and *Rhododendron campanulatum* in the Dhauladhar mountain range of Himachal Pradesh, India". *Appl. Ecol. & Environm. Sci.* 4(4): 102-–107.

Abstract: Among various natural forest products rhododendrons in the Himalayan region are regarded as one of the most important products in terms of consumption and high exchange values. Himachal Pradesh in India endows with many species of rhododendron, of which *Rhododendron arboreum* (Brash phool) and *Rhododendron campanulatum* (Kashmiri Patta) are studied in the Kangra district, which falls in Dhauladhar mountain range of the Indian Himalaya. The utilisation of *R. arboreum* flower as medicine, food supplements and cultural purpose is designated through Use Value Index (UVI). *R. campanulatum* is primarily used by temporary settlers for fuel wood or for making sheds to animals in the high reaches of the Himalaya because of its presence in this area, which is mainly deprived of other woody species. The population density of *R. arboreum* was 344.70±0.009 individuals/ha and the IVI was 241.05. *R. campanulatum* was found in much higher regions with the density of 120.95±0.007 per ha and the IVI 58.94. With respect to the distance from the road the average price of fresh and dry *R. arboreum* flowers varied. The market value chain of the raw material is complex. It is important to implement sustainable value chains for the management and conservation along with sustainable utilisation of rhododendrons in the study area.

214. **Sharma, N. & Kala, C.P. 2018.** "Patterns in distribution, population density and uses of medicinal plants along the altitudinal gradient in Dhauladhar mountain range of Indian Himalayas". *Curr. Sci.* 114(11): 2323-–2328.

Abstract: We studied the patterns in distribution, population density and uses of medicinal plant species in Dhauladhar mountain range of Himachal Pradesh in Indian Himalayas. The study area was stratified into three zones on the basis of forest types and altitudes. In each zone, quadrats were laid down for sampling of plant species, and the local people were interviewed for gathering information on medicinal uses of plants. A total of 184 plant species were encountered in the sampling plots, of which 86% had medicinal uses. Among woody plant species, the use of bark was highest, whereas in herbaceous species the use of leaf and root was highest for treatment of over 32 groups of diseases. In terms of density, *Pinus roxburghii* was the most dominant tree species in subtropical forests, which declined in temperate regions and was absent in subalpine forests. *Rhododendron arboreum* was the most dominant tree species in temperate region whereas in subalpine forests it was replaced by *Abies pindrow*, in terms of density. *Berberis asiatica* and *Vitex negundo* were the most dominant shrubs in subtropical forests besides *Lantana camera*, whereas *Berberis lycium* dominated the temperate and *Juniperus indica* dominated the subalpine forests. The heavy infestation of *Lantana camera*in sub-tropical forests has degraded the habitats of native medicinal plant species. Spearman's correlation indicates positive correlation between local uses and density of respective medicinal plant species ($P < 0.05$). The results are further discussed in light of medicinal plants conservation in this part of the Indian Himalayas.

215. **Sharma, N. & Walia, Y.K. 2016.** "Water quality evaluation of Satluj River with reference to heavy metals at Himachal Pradesh, India". *Biol. Forum- An Int. J.* 8(2): 405–409.

Abstract: Rivers are natural water bodies having various beneficial uses for mankind but these are severely polluted. In this study the analysis of Heavy Metals of Satluj river was undertaken. For this study four sampling stations were identified on the basis of pollution sources and samples from different stations were collected from May, 2015 to April, 2016. Heavy metals as Copper (Co), Cadmium (Cd), Chromium (Cr), Manganese (Mn), Nickel (Ni), Zinc (Zn) and Mercury (Hg) were analyzed. The analyses were carried out according to APHA, 2012 procedures. The results revealed that the different conditions Satluj river in different sampling stations showed fluctuations in some heavy metals. The analysis of data reveals that Cadmium, Chromium and Manganese were found to be higher than the permissible limit prescribed by Bureau of Indian standards (BIS), 2012 for drinking water in India and WHO, 2011 standards. The average values of Copper, Nickel, Zinc and Mercury was within permissible limit proposed by WHO, 2011 and BIS, 2012.

216. **Sharma, Nirupama, Gupta, J.K. & Sharma, Harish. 2018.** "Important bee flora for *Apis cerana* F. under mid hill conditions of Himachal Pradesh– A study of Katrain area in Kullu valley". *J. Non-Timber Forest Prod.* 25(2): 81–83.

Abstract: The bee forage includes survey of forage plants, assessment of the relative merits of the components species as source of nectar and pollen, their flowering sequence and floral calendar during season cycle. Himachal Pradesh, owing to its varied agro-climate, has a great variety of bee forage sources which provide the basis for development of beekeeping industry in the state. Bee keeping with *Apis cerana* is a common practice among the rural communities of the Kullu valley in the state. The identification of the existing bee flora will be useful to evaluate the suitability of Katrain area for *A. cerana* beekeeping and particularly to find out the dearth periods that would help to combat the shortage of food either by suitable feeding or migration of bee colonies to forage rich areas. This will be helpful in the formulation of the action plans for effective management of the *A. cerana* bee based livelihood avenues of the mountain people.

217. **Sharma, O.P. 2002.** "Efficient resin tapping and its processing in Himachal Pradesh: An overview". *Indian Forester* 128(4): 371–378.

Abstract: In the present paper, Resin, one of the important Non-Timber Forest Produce (NTFP) of Himachal Pradesh has been discussed with special emphasis on its extraction and processing and based on the Himachal Pradesh experience, ways and means to improve upon methods of extraction and processing of resin thus cutting down the wastage on fuel and resin lost as wastage have been suggested.

218. **Sharma, P. 2013.** *Ecological Assessment of Floristic Diversity and Possible Impact of Hydropower Projects in Kullu District of Himachal Pradesh, North Western Himalaya.* Ph.D. Thesis, Kumaun University, Nainital, India (Unpublished).

219. **Sharma, P., Samant, S.S., Tewari, L.M. & Rana, M.S. 2015.** "Diversity, distribution and conservation of orchids in Nargu Wildlife Sanctuary, Northwest Himalaya". *J. Orchid Soc. India* 29: 15–21.

Abstract: Like other parts of the Indian Himalayan Region, Himachal Pradesh also supports unique orchid flora. In the present investigation, extensive field surveys were conducted to study the orchid diversity of Nargu Wildlife Sanctuary during 2010–2015. During exploration of the floristic diversity, total 15 species of orchids representing 12 genera were recorded between 970–4052 m, amsl. These were analyzed for nativity and endemism. Eleven species were natives and four non-natives; 2 species were near endemic and one species *(Habenaria edgeworthii)* was endemic to Indian Himalayan Region (IHR). Among genera, *Habenaria, Herminium* and *Malaxis* (2 species each) were dominant. Different plant parts *i.e.,* leaves (6 species), aerial

parts and tubers (4 species each), bulbs (2 species), roots and rhizomes (1 species each) were used by the inhabitants for various therapeutic uses. Three species namely *Dactylorhiza hatagirea, Herminium monorchis* and *Malaxis muscifera* have been identified as Critically Endangered, 04 species *(Habenaria edgeworthii, Malaxis acuminata, Nervilia plicata,* and *Neottia listeroides)* as Endangered, 03 species *(Habenaria pectinata, Herminium lanceum* and *Spiranthes sinensis)* as vulnerable and 05 species *(Calanthe tricarinata, Epipactis helleborine, Goodyera fusca, Satyrium nepalense* and *Vanda cristata)* as near threatened. Habitat degradation, over exploitation, and complex nutrient requirement are causing rapid decrease in the population of these species in the area. Therefore, study on habitat ecology of these species requires priority attention. In addition, educational and awareness programmes on status and conservation and involvement of inhabitants in conservation would help in their conservation and management.

220. **Sharma, Poonam, Joshi, Arun & Sawan, Smriti. 2018.** "Data analysis of angiosperms from Renuka wetland, Himachal Pradesh". *Phytotaxonomy* 18: 118–124.

Abstract: The present study deals with data analysis of 73 plant species from Renuka wetland, Himachal Pradesh. The vegetation composition comprises 28 trees, 20 taxa of herbs, 20 taxa of shrubs and 5 taxa of climbers. Amongst these dicots dominate with 67 taxa while monocots have 6 taxa in the floristic composition.

221. **Sharma, Poonam, Sehgal, R.N. & Raj, Anup. 2009.** "Vegetational heretogeneity of woody plants in Himalayan landscape of Himachal Pradesh, India". *Indian J. Forest.* 32(1): 39–44.

Abstract: Species diversity, relative dominance and spatial distribution of woody plant species in the high hills of Western Himalayas were studied. The study area was poor in species diversity, both in terms of species richness and evenness. The highest values of Shannon's index were 1.984 and 2.136 for trees and shrubs respectively. Maximum sites were having lower values of Jaccard's index (J') and higher values of concentration of dominance (Cd). Evenness in the shrub communities was more as compared to tree communities. Twenty of the 24 sites were dominated by conifers. *Pinus gerardiana* dominated maximum number of sites (8) followed by *Cedrus deodara* (6 sites). Most of the species were contagiously distributed in most of the communities and only a few had random or regular distribution.

222. **Sharma, Poonam, Sehgal, R.N. & Raj, Anup. 2010.** "Natural regeneration of *Pinus gerardiana* in dry temperate forests of Kinnaur (Himachal Pradesh)". *Indian J. Forest.* 33(4): 511–518.

Abstract: *Pinus gerardiana* an economically important and ecologically significant coniferous tree species grows in the dry temperate forests of Kinnaur in Western Himalayas. Natural regeneration of the species is deficient as every single cone is

harvested from the tree and no seed is allowed to fall on the ground. Present study throws lights on its distribution and the status of natural regeneration in its natural zone of occurrence. The species is distributed from an average altitude of 1960 m to 3365 m above msl, but dominates the community 2900 m upwards. In most of the sites it was contagiously distributed except one site where it had random distribution. From strand structure as revealed by frequency distribution, it is evident that *P. gerardiana* stands are unmanaged. In general, regeneration was poor and there was preponderance of mature and over-mature trees.

223. **Sharma, P., Uniyal, P.L. & Slowik, J. 2014.** "Community involvement and conservation of *Taxus baccata* in Pangi valley, Himachal Pradesh". *Nat. Areas J.* 34: 470–474.

Abstract: *Taxus baccata* L. is a rare and endangered species in India. It is a medium-sized (10–20 m tall) evergreen tree. It produces the anti-cancer drug Taxol (paclitaxel). Taxol is also used for treating bronchitis, asthma, epilepsy, snake bites, scorpion stings, internal injuries, lung diseases, and diabetes. The main reasons for the decline of Himalayan yew are deforestation, browsing by herbivores, and commercialization of plants for extracting the drug. We concentrated our study in Pangi Valley (Chamba district, Himachal Pradesh). We worked with the local community to develop a strategy for conservation and sustainable use of *Taxus baccata*. We collected twigs of Taxus from the forest of Tandah (alt. 3900 m) of Pangi Valley, Chamba district. We rooted the twigs without any chemical treatments with the assistance of the local inhabitants near Purthi Village. We proved *Taxus baccata* could be propagated and grown in a nursery in Pangi Valley. *Taxus* cultivation can create income for local communities. We suggested Pangi Valley in Himachal Pradesh, India, as an Important Plant Area (IPA). We also felt participation of the government is a prime need for constant income through medicinal plants cultivation using ethnobotanical knowledge.

224. **Sharma, R.C., Singh, N.B., Tripathi, D. & Sood, A. 2911.** "Status and distribution of Willow mortality in Lahaul and Spiti Cold Desert of Himachal Pradesh". *Indian Forester* 137(2): 196–204.

Abstract: A survey on the status and distribution of willow mortality in the cold desert of Lahaul and Spiti district of Himachal Pradesh was conducted during 2007. Large scale willow mortality ranging from 2 to 93.8 per cent was recorded in Lahaul sub-division. The extent of mortality was higher in Chandra valley as compared to Pattan and Bhaga valleys. In Spiti sub-division willow mortality was recorded only at Qurith (2%). Investigations revealed that *Cytospora canker* caused by *Cytospora chrysosperma* is the major cause of willow mortality. At few places scale insect (*Lepidosaphes* sp.) infestation was also recorded. Based on the causes of the mortality, a package of recommendations has been suggested to reduce the willow mortality in the cold desert areas.

225. **Sharma, R.K. 2011.** "Palynological studies on some conifers of Himachal Pradesh". *Indian Forester* 137(12): 1432–1438.

Abstract: The conifers comprise 52 genera and nearly 560 species. Only 29 species belonging to 11 genera occur in India, mostly confined to North-West and Western Himalayas. Out of 14 conifer species found in Himachal Pradesh, 12 species were worked out palynologically in the present study. Study includes pollen size, number of wings and percentage of variation in normal and abnormal pollen grains. The data thus collected is not only of taxonomic value but also helps to understand the evolutionary process of pollens from winged stage to the wingless stage. To explain the multiallelic gene interaction behind the formation of wings of pollens in Pinaceae, the Gene Blocks Hypothesis was tested. It is probably the multiallelic gene interaction that leads to the formation of monosaccate, Bisaccate, trisaccate, multisaccate and nonsaccate pollen grains in Pinaceae. In Cupressaceae and Taxaceae, pollen grains are nonsaccate. Abnormal pollens with incomplete separation or well formed apparently macropollens have been observed. The species with smallest and largest pollen size have been identified.

226. **Sharma, Sandeep. 2011.** "Seed source variation in *Jatropha curcas*: Oil, seed and germination charactereistics of twenty diverse populations in Himachal Pradesh". *Environm. & We* 6(4): 183–191.

Abstract: *Jatropha cuscas* as biodiesel plant prove very important to Indian economy owing to continuously increasing energy demand. The seeds of this plant yield oil suitable as fuel for diesel engine. *Jatropha* plant found to grow at various places in Himachal Pradesh at different altitudinal/microhabitat conditions in their wild state. The present study was conducted to determine the variation in oil yield, seed characters, germination and growth parameters by taking composite seed samples of twenty seed source of *Jatropha curcas* from various part of Himachal Pradesh. The oil content of whole seed varies from 24.51% to 41.83%. Seed weight of 100 seeds varies from 42.0 to 72.75 g. Where as seed length varies from 17.04 mm to 18.79 mm and seed breadth varies from 10.60 mm to 11.25 mm. Similarly, germination and growth parameters were also studied and found to have significant variations. On the basis of present investigation seven seed sources having oil content >35% (whole seed basis) can be considered for any large scale planting programme in the state of Himachal Pradesh.

227. **Sharma, S.K. 1991.** "Observations on the performance of Poplars in the Cold Desert area of Spiti Valley (H.P.)". *Indian Forester* 117(4): 284–285.

228. **Sharma, V. & Walia, Y.K. 2016.** "Water quality assessment of Gobind Sagar Lake during rainy season in Himachal Pradesh, India". *Biol. Forum- An Int. J.* 8(1): 559–564.

Abstract: This study was undertaken to determine the physico-chemical properties and heavy metals in water samples collected from Gobind Sagar Lake during Rainy Season in Himachal Pradesh, India. Water quality parameters and heavy metals were Water Temperature; pH; Conductivity; Total Alkalinity; Chemical Oxygen Demands; Dissolved Oxygen; Chloride; Total Hardness; Calcium Hardness; Magnesium Hardness; Dissolved Carbon Dioxide; Total Dissolved Solid; Biological Oxygen Demand; Cadmium; Copper; Chromium; Zinc; Nickel; Calcium; Lead; Manganese and Iron. The results revealed that the different conditions of Gobind Sagar Lake at different sampling stations showed fluctuations in some physico-chemical parameters and also in heavy metals. These result depicted that lake water was polluted at some of sampling stations due to bathing activities, boating activities, joining of sewage, agricultural activities and its runoff in and around the catchment area of Gobind Sagar Lake.

229. **Sinha, S.K. & Samant, S.S. 2006.** "Climate change in the higher Himalayas: A case study in Lahaul valley". *ENVIS Newsletter: Himal. Ecol.* 3: 3–4.

230. **Smith, E. & Smith, H.B. 1899.** *Shimla Flowers: An Annotated List of Flowers Collected in the Neighbourhood of Simla and Mashobra*. Privately Printed, Simla and Calcutta.

231. **Singh, Ashok & Gupta, N.K. 2009.** "Assessment of floristic diversity and regeneration status of *Cedrus deodara* (Roxb.) Loud. Stands under forest management systems in Western Himachal Himalayas: A case study of Shimla district". *Indian J. Forest.* 32(1): 45–54.

Abstract: The documentation of forest wealth in the Himalayas is of great importance because of biotic pressure on them. The applied system of management and conservation of forests is of immediate concern for the present and future generation. Such study is useful to know the type of plant community development through succession under single stand management system. The present study revealed the dominance of *Cedrus deodara* an endemic species of Indian Himalayas in all Periodic Blocks (PB) with maximum dominance in PB II. Among different PBs maximum diversity in species was found in PB IV with highest density of *Quercus floribunda* followed by *Cedrus deodara* and *Pinus wallichiana*. Among shrub species *Berberis aristata* showed maximum dominance in PB I, PB II and PB IV. However, *Sarcococca saligna* was dominant in PB III and as a next dominance species in PB I and PB II. It is also showed highest density in PB I, PB II and PB III. While *Berberis aristata* indicated highest density in PB IV. Among herbaceous vegetation most dominant species was *Eragrostis nutans* in all periodic blocks. The maximum regeneration of *Cedrus deodara* was found in the decreasing trend as PB I > PB IV > PB III > PB II. The maximum contribution to regeneration among various periodic blocks was of *Cedrus deodara* followed by *Quercus floribunda, Pinus wallichiana* and *Quercus leucotrichophora*.

232. **Singh, A. 2007.** *Assessment of plant diversity and Conservation Status of Forest Vegetation in a Proposed Cold Desert Biosphere Reserve of the Western Himalaya.* Ph. D. Thesis. Kumaun University, Nainital (Unpublished).

233. **Singh, D.V. 1995.** "Role of forests in rural economy of Himachal Pradesh". *Indian Forester* 121(3): 207–213.

Abstract: The present study is designed to know the extent of forest resources and economic returns to the rural people of Himachal Pradesh and is based on field data collected under wood balance study of A.E.Rr Centre, H.P. University, Shimla from 560 respondents of different size classes spread in four agro-climatic zones of the State. The study aims at' not only estimating the extent of dependence of locals upon forests, but also at providing a value (in monetary terms) to the usufructs availed by the villagers from the forests in the State. The sampling design of study is based on multistage stratified random sampling. The data pertains to 365 days for the year 1989-1990 and was collected by day to day accounting.

234. **Singh, G., Rai, I.D., Rawat, G.S., Goraya, G.S & Jalal, J.S. 2015.** "Additions to the flora of Great Himalayan National Park, Western Himalaya". *Indian J. Forest.* 38(4): 375–381.

Abstract: A floristic survey was conducted in the Great Himalayan National Park (GHNP), Himachal Pradesh during 2010-2011. The survey resulted of 66 species of angiosperms belonging to 55 genera under 32 families. These belong to 1 tree, 13 shrubs, 2 climbers and 50 herbs. The information related to the flowering, altitude, habit and uses are also provided.

235. **Singh, H. & Kumar, P. 2017.** "A brief overview of vegetation of Pangi valley (Chamba, Himachal Pradesh): A high altitude region of northwest Himalaya, India". *Biosci. Biotechnol. Res. Asia* 14(2): 625–630.

Abstract: Preliminary survey was conducted in the Pangi Valley which is an high altitude region of Northwest Himalaya, India. Pangi Valley has been least studied for floristic studies except for few cytological and ethnobotanical studies. Pangi was excluded in Flora of Chamba district and there is not much information on the vegetation. With the ever increasing population and, stress on natural resources for human needs, Pangi is now headed to a road for development. This area which hold enormous potential of vast floral and faunal genetic diversity requires to be explored before it is too late. The current attempt aims to present a general overview of the vegetation and information about some important plants of this geographically important cold desert region of India.

236. **Singh, H. & Sharma, M. 1989.** Phytogeographic observations on the flora of Chamba district (Himachal Pradesh). In: Trivedi, M.L., Gill, B.S. & Saini, S.S. (Eds.), *Plant Science*

Research in India. Today and Tomorrow's Printers and Publishers, New Delhi, Pp. 217–225.

237. **Singh, H. & Sharma, M. 2006.** *Flora of Chamba District (Himachal Pradesh*). Bishen Singh Mahendra Pal Singh, Dehra Dun.

Abstract: Chamba district crowning Himachal Pradesh in the north is the land of myths and legends irresistible beauty of the valleys rushing water of rivers streams and springs worshippers and pilgrimage and has few rivals for its scenic beauty. The present book is the first serious taxonomic investigation on the vegetation of the Chamba district. It is an outcome of systematic field surveys and study of literature and exsiccata in different Indian herbaria for over a decade. A comprehensive floristic account of the existing vegetation has been provided. Phytogeographical ethnobotanical and conservational aspects have been covered with the help of different analyses and information of various sorts. Dichotomous keys have been provided for the segregation of various taxa. 54 plates have been given along with the relevant species besides some coloured photographs. The main body deals with 1005 species of seed plants belonging to 545 genera distributed among 133 families. Predominantly these include angiosperms whereas gymnosperms are represented by 6 species 5 genera and 2 families only.

238. **Singh, J., Rajasekaran, A., Negi, A.K. & Panwar, V.P. 2014.** "Wild edible plants diversity in *Pinus gerardiana* Wall. ex D. Don forests of Kinnaur district, Himachal Pradesh, India". *Indian J. Forest.* 39(1): 13–20.

Abstract: Wild edible plant diversity in *Pinus gerardiana* forests of district Kinnaur, Himachal Pradesh was assessed following quadrate method using stratified random sampling. A total of 55 plant species comprising of five trees, 21 shrubs and 29 herb species have been recorded in the study area. Out of the total recorded plant species, 54.55 per cent were edible and 45.45 per cent were non-edible. Among trees, *P. gerardiana* was recorded with the highest density of 206.77 trees/ha, basal area of 22.43 m^2/ha and IVI value of 252.81. Among edible shrubs a rarely used plant, *Daphne oleoides* was the most dominant species with highest density (0.21 bushes/ 9m^2), frequency (21.23%) and IVI (71.55). In case of herbs, *Thymus serphyllum* had the highest density of 2.91 individuals/m^2, frequency (12.04%) and IVI (31.57). During the present study, it has been observed that the *P. gerardiana* is an important commercial tree species exploited for its edible nuts. However, due to over exploitation, grazing, habitat degradation and other biotic threats its natural regeneration is dwindling. Besides this important natural resources, other species viz., *Prunus persica, Berberis aristata, Elaeagnus umbellata, Chenopodium album, Phytolacca acinosa* etc. also have market potential, however adequate emphasis has not been laid on their propagation and conservation. The results also revealed that many wild species are under growing

pressures from various anthropogenic factors. Therefore, it is suggested that large scale awareness programmes on wild edible plants should be initiated and these species should be included in the forestry/rural plantation programmes. Further, propagation plan needs to be developed on important wild edible plant species and people should be encouraged to grow these wild edible plants of commercial importance which will reduce the pressure on the wild populations growing in the forest areas.

239. **Singh, K.N. 2008.** *Ecological Studies on Landscape Elements, Species Diversity and Ethnobotany of Higher Plants in Lahaul-Spiti Region of Western Himalaya*. Ph. D. Thesis; HNB Garhwal Univ., Srinagar Garhwal (Unpublishd).

240. **Singh, M., Lankar, U. & Zaffar, S.N. 2018.** "Endangered medicinal plant *Taxus baccata* Hook. f. and natural regeneration status in Himachal Pradesh, India". *Indian Forester* 144(9): 812–816.

Abstract: In present study, natural regeneration status of *Taxus baccata* along with other associated tree species was assessed in three forest divisions of Himachal Pradesh, North Western Himalaya, India. Two sites were selected in each division and were further divided into lower (2500-2700 m) and upper (2700-2900 m) elevations. The results revealed that the recruitments of *Taxus baccata* are good enough at higher elevations as compared to lower elevations, but there is no any established regeneration in all three forest divisions. The incidence of over-harvesting and other anthropogenic pressures was comparatively higher at lower elevations, leading to poor regeneration of the species. Associated species showed better recruitments and established regeneration as compared to that of *Taxus baccata*, which attributed that natural regeneration of this species is being fatally hampered due to exclusive over exploitation. The study suggests that there is an immediate need to protect *Taxus* bearing forests from harvesting (lopping, peeling bark, etc.), grazing and other destructive activities. The species regenerates poorly from seed. By means of efficient biotechnological tools, artificial regeneration of the species should be promoted in nursery to develop mass scale healthy planting materials. Besides in-situ conservation and management, mass scale afforestation of the species with the participation of local communities in protected forest areas particularly at religious forests need to be done.

241. **Singh, P.B. 1992.** *Flora of Mandi Forest Divisoon, Himachal Pradesh, India*. Ph. D. Thesis, H.N.B. Garhwal University, Srinagar, Garhwal (Unpublished).

242. **Singh, R. & Sharma, G. 1986.** "Limnological studies of Manikaran hot water springs, Himachal Pradesh, India". *Trop. Ecol.* 27: 143–146.

243. **Singh, R. & Verma, R.K. 1983.** "Changes in floristic composition of the herbaceous

vegetation under three different forest communities at Summer hill, Shimla". *Indian J. Ecol.* 13(2): 205–210.

244. **Singh, R., Thakur, G.C. & Sood, V.K. 1994.** "Phytosociology and resource utilization by different forest trees in South-Eastern slopes around Shimla, Himachal Pradesh". *Indian Forester* 120(12): 1108–1119.

Abstract: In the present study, different forest tree species occurring in south-eastern slopes of Shimla town, Himachal Pradesh were investigated for phytosociological attributes and resource utilization by selecting three sites having slope angle of 30-45° and altitude ranging from 1700-2400 m. *Pinus roxburghii* was recorded as dominant species at Site I and *Cedrus deodara* at Sites II and III. On the basis of IVI, *Quercus incana* was recorded as co-dominant in all the sites. Gradual decrease in basal cover of trees from top to bottom in different slopes was recorded at Site II while this pattern was irregular at Sites I and III. Maximum basal cover (8193.09 cm^2/ 100 m^2) was recorded for *Pinus roxburghii* at Site I followed by *Cedrus deodara* (8165.18 cm^2 /100 m^2) at Site II indicating that these species are at mature stages in both the sites. In all the three Sites, the forests were characterised by preponderance of contagious distribution of trees followed by random while regular distribution was completely absent. The values of species diversity (0.308-2.244) and concentration of dominance (0.235-0.918) lie within the range reported for temperate forests. In general, dominance of one species was recorded for resource utilization except for some slopes where the resources were shared by more than one species.

245. **Singh, R., Sood, V.K., Bhatia, M. & Thakur, G.C. 1991.** "Phytosociological studies on tree vegetation around Shimla, Himachal Pradesh". *Indian J. Forest.* 14(3): 169–180.

Abstract: In the present study, different tree species growing around Shimla town were analysed for various phytosociological attributes and resource utilization at four slopes, viz. Hill top, upper slope, lower slope and hill base in three selected sites. The density (trees/100 m^2) varied from 7.83 (site II, hill base) to 13.8 (site III, upper slope). The basal cover (cm^2/100 m^2) ranged from 1515.67 (site II, hill base) to 9895.18 (site I, II, upper slope). On the basis of IVI values, the following types of communities were recognised *Quercus incana-Rhododendron arboreum* at site I, *Cedrus deodara-Pinus roxburghii-Quercus incana* at site II and *Quercus dilatata, Picea smithiana* and *Pinus wallichiana* at site III. Vegetation showed mainly contagious distribution pattern followed by random and then regular. Diversity index and concentration of dominance values confirmed the temperature nature of these forests. Dominance-diversity curves followed geometric series. Site III showed greater share of resources among different species while site I and II indicated dominance of one or two species for resource share.

246. **Singh, R.D., Sinha, B.K., Sud, R.K., Tamang, M.B. & Chakrabarty, D.N. 1994.** "Weed flora in tea plantations of Himachal Pradesh". *J. Econ. Taxon. Bot.* 18(2): 399–418.

Abstract: The survey of weed flora occurring in tea plantations in Kangra valley, Himachal Pradesh, revealed presence of 340 species belonging to 229 genera from 67 families, comprising of 51 dicot, 11 monocot and 5 pteridophyte families. Poaceae, Asteraceae and Fabaceae were the major families, in order of merit in the number of species encountered. Occurrence of many useful plants growing wild in these plantation were also recorded, which could be developed for medicinal, aromatic, industrial, ornamental, food and fodder values.

247. **Singh, R.P. & Gupta, M.K. 1991.** "Soil and vegetation study of Lahaul and Spiti Cold Desert of Western Himalayas". *Indian Forester* 116(10): 785–790.

Abstract: Soil properties and vegetation studied in different localities of Labaul and Spiti valley of Western Himalayas are briefly described. The soil is silty clay loam, silty loam in texture having more alkalinity. Organic matter content varies from 0.08 to 2.98 per cent in the soil samples collected from different localities in the area under study. The nutrients e.g. Ca, K, Na and P were observed in decreasing order in all the sites. The growth of tree species, grasses and shrubs is poor because of the short growing period which is hardly five to six months or sometimes even less. Frequency, density, abundance, relative density and Importance Value Index (I.V.I.) bave been determined for each species. *Hippophae rhamnoides* is an important shrub used as fuelwood and as protective hedge. Important tree species of this valley bave also been described.

248. **Singh, R.P. & Gupta, M.K. 1992.** "Vegetation survey and ecological studies under Silver Fir and Spruce forests of Himachal Pradesh". *Indian Forester* 118(7): 460–465.

Abstract: This paper describes the phytosociological studies under spruce-fir (*Picea smithiana* and *Abies pindrow*) forests at Narkanda, Himachal Pradesh. Abundance, frequency, density, Importance Value Index (I.V.I.) and morphological characters such as diameter, height and basal area have been worked out for individual ground vegetation species. The community is dominated by *Fragaria indica* and the contribution of *Swertia chirata* is recorded least in community development.

249. **Singh, R.P. & Jishtu, V. 1997.** "C*olutea nepalensis* Sims.–An important shrub of Cold Desert region of India". *Indian Forester* 123(7): 637–642.

Abstract: The study was conducted in the cold desert region of India in the State of Himachal Pradesh and Jammu & Kashmir. C*olutea nepalensis* Sims attains an average height of 1.20 m with 2.50 m^2 average crown area. The shrub provides effective soil cover and binds soil over an area of 3.25 m^2. The contribution of aboveground biomass was maximum (57.61%) to the total biomass followed by root biomass (42.39%). The

taper rate varies from 0.21 to 0.42 in tap-root and 6.17 to 0.30 in lateral root, which itself is an indication of the strong root system of the species. Stem contributes maximum energy content (4400 cal/g dry weight) followed by root (4000 cal/g dry weight) and leaves (3270 cal/g dry weight) in descending order.

250. **Singh, R.P. & Negi, D.V. 1996.** "Performance of exotic Poplars under nursery conditions in Himachal Pradesh". *Indian Forester* 122(2): 122–127.

Abstract: In search of promising clones suited to lower areas of Himachal Pradesh, a nursery trial of twenty nine exotic clones received from Forest Research Centre, Lal Kuan (Uttar Pradesh Forest Department) was conducted. *Populus deltoides* clones 247/84, 75/84, 29/82, 200/84 and 51/84 and American clones 110702, S7Cl, ST-72 and 64-243-1 were proved to be the best suited for this tract. These clones are being further tested in different nurseries, situated in different agro-climatic conditions of Conifers Research Centre, Shimla for Large scale plantation programme.

251. **Singh, R.P., Bahar, N. & Chand, P. 1992.** "Autecology of *Capparis spinosa* Linn. in cold desert of Spiti valley in Himachal Pradesh". *Ann. Arid Zone* 31(4): 291–293.

252. **Singh, R.P., Negi, D.V. & Chand, P. 1997.** "Ecological studies on *Rosa webbiana* Wall. ex Royle in Cold Desert areas of Spiti valley in Himachal Pradesh". *Indian Forester* 123(9): 827–830.

Abstract: The present study was conducted in the cold desert areas ofSpiti Valley in the State of Himachal Pradesh. *Rosa webbiana*, seeds should be treated with concentrated sulphuric acid for 20 minutes duration to enhance its germination. It can be propagated by stem cutting and root suckers. Stem and branches contribute maximum to the total biomass followed by root and leaves in that order. Approximately twenty shoots sprout from single root stock and form a colony over barren slopes which checks the erosion. Total biomass on dry weight basis was 5.42 kg/plant and energy ranged from 3.1 to 4.2 K.cal/g dry weight. An average bush accumulates 20615 K. cal of energy per plant.

253. **Singh, R.P., Rawat, D. & Jishtu, V. 1998.** "Agroforestry on cold desert areas of Himachal Pradesh, India". *Indian Forester* 124(5): 321–330.

Abstract: Agroforestry plays an important role in the development and improvement of an area. The existing agroforestry practices in different parts of India and their potential contribution to sustainable development in cold desert region of Himachal Pradesh, India, as well as the potential for developing and improving agroforestry with rural people participation has been recommended. Different agroforestry systems have been suggested for improving tbe productivity of land in cold desert region.

254. **Singh, R.P., Sharma, K.C. & Gupta, M.K. 1981.** "*Rumex hastatus*: A suitable shrub for erosion control in Himachal Pradesh". *Indian J. Forest.* 4(4): 310–317.

Abstract: The present investigation deals with the eco-morphology and root behaviour of *Rumex hastatus* D. Don. The plant is more or less circular in shape having 45.04 cm mean height and 17732 cm^3 mean crown volume and provide effective protection to the soil below. *R. hastatus* flowers twice a year and produces on an average about 4816 seeds per plant at one time of flowering. The seed is highly fertile and ensures good germination percentage (49.7%) even on landslips. Thus a plant can produce from its seed about 2400 plants or more even on landslips. *R. hastatus* roots grow fast and penetrate deep in the soil and their taper rate is also very low. Its roots are, therefore, strong and bind the soil well even on 60% slope. On the basis of these results, growing of *R. hastatus* on hilly slopes for landslip and roadside stabilisation is suggested.

255. **Singh, R.P., Bahar, N., Prasad, B. & Gupta, M.K. 1991.** "Ecological studies on *Hippophae rhamnoides* Linn. in Spiti valley of Himachal Pradesh". *Ann. Arid Zone* 30(2): 119–122.

256. **Singh, S. & Nath, Baij. 1987.** "Some overlooked plant species of Himachal Pradesh". *J. Econ. Taxon. Bot.* 10(1): 183–186.

Abstract: 29 plant species belonging to 25 genera and 16 families of flowering plants are reported here which are not included in the recently published Flora of Himachal Pradesh (Chowdhery & Wadhwa, 1984).

257. **Singh, Sukhjinder, Singh, Virendra, Babu, G.D.K., Kaul, V.K. & Ahuja, P.S. 2006.** "Techno-economic feasibility of wild marigold (*Tagetes minuta*) oil production in Himachal Pradesh". *J. Non-Timber Forest Prod.* 13(4): 267-271.

Abstract: Essential oil production from wild marigold (*Tagetes minuta* L.) crop in selected locations of Himachal Pradesh has become a popular practice for gaining additional income and employment in farm sector. The study presents economics of essential oil production having components of cultivation and oil distillation I Himachal Pradesh, being practised by the local farmers. Cost of cultivation for the average herbage yield of 200 qs was worked out to be Rs. 42,497/ha/crop season. Cost of oil production and net returns was determined as Rs. 1,175.28/kg oil and Rs. 41,236/ha/season, respectively. *T. minuta* oil production was not only techno-economically feasible but also a remunerative venture with a benefit- cost ratio (BCR) of 1.70, pay back period of 4.24 years (8.48 seasons), break even production at 31 kg oil and rate of return on total capital at 15.78% as found out from the study.

258. **Singh, S.K. 1998.** "Vegetation structure under North and South aspects in the temperate zone of Tirthan valley, Western Himalaya". *Indian J. Forest.* 21(3): 217–223.

Abstract: The present paper deals with the species composition, distribution pattern, diversity, concentration of dominance and community co-efficient under two aspects,

viz., North and South facing slopes in the Tirthan valley of H.P. There was a marked difference in composition of tree, shrub and herbaceous species under these aspects. The North facing slopes was dominated by *Abies pindrow, Picea smithiana* and *Cedrus deodara*, whereas the southern aspect is mainly dominated by *Pinus wallichiana*, *Quercus semecarpifolia* and *Rhododendron arboretum*. The densities of *Abies pindrow* and *Picea smithiana* were higher on the north facing slope as compared to southern aspect. The diversity of north and south facing slopes were 0.638 and 0.208 respectively. Only a few genera are present on both the slope aspect like *Picea, Cedrus* and *Abies*.

259. **Singh, S.K. 1999.** *A study on the plant community composition and species diversity in the Great Himalayan National Park, Western Himalaya*. Ph. D. Thesis, Kumaun University, Nainital (Unpublished).

260. **Singh, S.K. & Ramesh, K. 2001.** "Status of incense plant, *Jurinea dolomiaea* Boiss. in western Himalaya". *J. Non-Timber Forest Prod.* 8(1-2): 109–113.

261. **Singh, S.K. & Rawat, G.S. 2000.** *Flora of Great Himalayan National Park, Himachal Pradesh*. Bishen Singh Mahendra Pal Singh, Dehra Dun.

Abstract: The flora deals with the systematics, ecology and conservation aspects of the vascular plants (Angiosperms and Gymnosperms) found in and around the Great Himlayan National Park, Himachal Pradesh. A total of 832 plant species belonging to 427 genera under 128 families has been recorded for this area. Within this 832 species, 794 belong to angiosperms (634 dicot and 160 monocot), 11 gymnospers and rest 27 species from pteridophytes.

262. **Singh, V. & Singh, R.K. 2004.** "Morpho-biochemical variations in Seabuckthorn (*Hippophae* spp.) populations growing in Lahaul valley, dry temperate Himalayas". *Indian Forester* 130(6): 663–672.

Abstract: The present study was carried out on survey of resources and morphological and biochemical variations in the natural populations of Seabuckthorn (*Hippophar* L.) growing in Lahaul valley (2,600 – 3,200 m asl) of district Lahaul-Spiti, a dry temperate region of Himachal Himalayas. There is about 400-500 ha land area under Seabuckthorn in Lahaul. Plant size varied from 101-271 cm in *H. rhamnoides* to 400-700 cm in *H. salicifolia*. Weight of 100 fruits varied from 11.6-19.5 g in *H. rhamnoides*, to 30.7 g in *H. salicifolia*. Colour of fruits was red to reddish-orange and yellowish-orange in *H. rhamnoides* and yellow in *H. salicifolia*. Shape of the seed in *H. rhamnoides* was oval to ovate, elongate, round elliptical, whereas it was ovate in *H. salicifolia*. Total oil content in the fresh ripe fruit of *H. rhamnoides* varied from 2.9-4.6%, which were significantly ($P<0.05$) higher than *H. salicifolia* (2%). Total protein content varied from 2.1-3.4% in *H. rhamnoides*, which was also significantly ($P<0.05$) higher than *H.*

salicifolia (1.2%). Further surveys are required for the selection of some promising forms of *H. rhamnoides* in other regions of Himalayas.

263. **Singh, V., Sharma, L.K. & Rana, R.K. 2015.** "Evaluation of some exotic forms of Seabuckthorn (*Hippophae rhamnoides* ssp. *mongolica*) in cold desert Himalaya". *Ann. Pl. Sci.* 4(3): 1003–1007.

Abstract: Five exotic improved forms of seabuckthorn (*Hippophae rhamnoides* ssp. *mongolica*) introduced during 3 different years, are being evaluated for their growth at Himachal Pradesh Agricultural University's High Land Agricultural Research and Extension Centre, located at Kukumseri (2730 m a.s.l) in district Lahaul Spiti, a dry temperate region of Himalayan state of Himachal Pradesh. The region is characterized by low rainfall (about 450 mm/yr) and heavy snowfall (100 400 cm/ yr). The first exotic form "H1 1" introduced in 1995, after 7 years of growth, had a diameter of 2.8 cm at base, 178 cm of height, a narrow canopy spread of 29 cm. This form had the fruit weight of 30.5 cm/100 fruits. The two other exotics Hl 2 and Hl 3, after 4 years of growth had the heights of 37 and 52 cm and canopy spread of 6.5 and 12 cm, respectively. The other two exotics Hl 4 and Hl 5 introduced in 2001, have also adapted to the local conditions. No decease has been recorded in any exotic form introduced at the center. All the forms were nearly thornless, except Hl 4.

264. **Sood, R.P., Kalia, N.K. & Sobti, S.N. 1982.** "Scope for development of phytochemical and essential oil industry in Palampur area (Kangra valley)". *Nagarjun* 14: 30–34.

265. **Sood, V.K. & Bhatia, M. 1991.** "Population structure and regeration status of tree species in forests around Shimla, Himachal Pradesh". *Van Vigyan* 29(4): 223–229.

266. **Srivastava, S.K. 2003.** Floristic diversity of Renuka lake wetlands and its environs. In: Janarthanam, M.K. & Narasimhan, D. (Eds.), *Plant Diversity, Human Welfare and Conservation*. Goa University, Goa, Pp. 93–109.

267. **Srivastava, S.K. 2003.** "Floristic composition of Pong Dam sanctuary, Himachal Pradesh". *Phytotaxonomy* 3: 99–102.

Abstract: Pong Dam (Maharana Pratap Sagar) reservoir is one of the largest man-made wetland in the northern part of India at the foothills of Dhauladhar range in Kangra district of Himachal Pradesh. The reservoir extends for *ca* 42 km from north-eastern end to the south-west direction and is fed by river Beas and its five perennial /seasonal tributaries. The catchment of Pong reservoir is *ca* 12,650 sq. km. The reservoir provides a suitable habitat and stopover for thousands of migratory birds that enter India from the Central Asian region. Apart from this, it also serves as a breeding ground to Mahasher fish. Pong wetland has been identified as one of the National wetlands and also designated as one of the Ramsar sites. The vegetation of the catchment is mainly of mixed deciduous broad leaved forest and secondary

scrub formation. The present article deals with the vegetation type and floristic analysis of Pong reservoir and plants found in the catchment areas, which include ea 187 species belonging to 136 genera and 64 families. Some of the important medicinal or otherwise economic plant species in the study area are *Vitex negundo* L., *Xanthium strumarium* L., *Holarrhena pubescens* Wall. ex G. Don, *Trichodesma indicum* (L.) R. Br., *Grangea maderaspatana* (L.) Poir., *Solanum nigrum* L., S. *surattense* Burm. f., *Asparagus adscendens* Roxb., *Acacia catechu* Willd., *Abelmoschus crinitis* Wall., *Momordica charantia* L., *Mallotus philippensis* Muel.-Arg., *Cannabis sativa* L., *Milletia extensa* Benth. ex Baker, *Boehmeria platyphylla* D. Don, *Nyctanthes arbor-tristis* L. and *Embelia tsjeriam-cottam* (Roem. & Schult.) A. DC.

268. **Srivastava, S.K. 2010.** "Floristic diversity and conservation strategies in cold desert of western Himalaya, India". *J. Pl. Sci. 7*: 18–25.

Abstract: The rich flora of cold desert constitutes an incredible store house of plant genetic resources that contribute not only to the livelihoods of enormous number of forest dwelling but also to the various pharmaceuticals industry. The plant wealth of Ladakh in Jammu and Kashmir, Lahaul-Spiti in Himachal Pradesh and Nelang valley in Uttarakhand falls in cold desert region of North-West Himalaya. The floristic documentation of this area represents ca 1405 species, 490 genera under 98 families of flowering plants. A large number of species growing in this area are of medicinal and economic value and used by local inhabitants for curing their ailments. Floristic analysis, brief account of physiography, vegetation types and adaptations in the plants for their survival, endemism, threatened taxa, medicinal and economic plants have been discussed along with the threats and conservation strategies.

269. **Srivastava, S.K. & Chandrasekar, K. 2005.** "Contribution to the flora of Himachal Pradesh from Pin valley National Park". *Bull. Bot. Surv. India 47*(1-4): 159–162.

Abstract: Five taxa belonging to the family Poaceae, viz., *Hordeum brevisubulatum* (Trin.) Link subsp. *nevskianum* (Bowden) Tzvelev, *Poa aitchisonii* Boiss., *P. attenuata* Trin., *P. kanaii* Rajb. And *Stipa arabica* Trin. & Rupr. have been reported for the fisrt time for the state of Himachal Pradesh from Pin Valley National Park.

270. **Srivastava, S.K. & Shukla, A.N. 2015.** *Flora of Cold Deserts of Western Himalaya.* Vol. 2 (Dicots.). Botanical Survey of India, Kolkata.

Abstract: Cold desert lies in Trans-Himalayan zone rain shadow of the main Himalayan range and is usually described as 'High Altitude Cold Desert'. It is also a fragile ecosystem located in one of the Hot Spots area in India. The flora of Cold Desert of Western Himalaya, volume- 2 provides a detailed floristic account of 1268 taxa, which comprises Pteridophytes [22 species, 1 subspecies, 16 genera and 10 families], Gymnosperms [15 species, 1 variety, 6 genera and 3 families] and Angiosperm [1158 species, 29 subspecies, 41 varieties, one forma distributed under 384 genera and 72

families]. Currently accepted names along with synonyms, detailed taxonomic description, phenology, ecological notes and specimens examined were provided.

271. **Subramani, S.P. 2006.** Systematic studies on the flora of Churdhar Wildlife Sanctuary, Himachal Pradesh. Ph.D. Thesis, FRI (Deemed University), Dehra Dun (Unpublished).

272. **Subramani, S.P. & Kapoor, K.S. 2011.** "Floristic elements of Churdhar Wildlife Sanctuary: Additions to the floral wealth of district Sirmaur, Himachal Pradesh". *Int. J. Threatened Taxa* 2(1): 94–104.

273. **Subramani, S.P., Kapoor, K.S. & Goraya, G.S. 2014.** "Additions to the floral wealth of Sirmaur District, Himachal Pradesh from Churdhar Wildlife Sanctuary". *J. Threatened Taxa* 6(11): 6427–6452.

Abstract: A total of 352 species of phenerogams comprising 251 dicotyledons, 97 monocotyledons and four species of gymnosperms belonging to 85 families collected from Nohra Forest Block of Churdhar Wildlife Sanctuary, district Sirmaur, Himachal Pradesh are reported as additions to the district. This includes 13 threatened species under different Red List assessments, both global and regional and 35 species are endemic to western Himalaya.

274. **Subramani, S.P., Jishtu, V., Verma, R.K. & Kapoor, K.S. 2017.** "Floristic composition, life-forms and biological spectrum of Renuka Wildlife Sanctuary, Himachal Pradesh". *Indian Forester* 133(1): 79–82.

Abstract: Floristic studies were conducted in Renuka Wildlife Sanctuary from 1999 to 2003. A total of 395 species belonging to 316 genera and 115 families were collected and identified. It includes 228 species of medicinal and aromatic plants, 85 species of exotics. The biological spectrum of study area reveals that the vegetation is theronanophanerophytic. The life forms of the area are Megaphanerophyte (0.52%), Mesophanerophyte (12.34%), Microphanerophyte (16.54%), Nanophanerophyte (19.16%), Chamaephyte (7.61%), Hemicryptophtye (5.51%), Geophyte (2.10%), Hydrophyte or marsh plants (3.41%), Therophyte (31.24%), Liana (0.79%), Parasite (0.52%) and Epiphyte (0.26%). The higher percentage of therophyte when compared to normal biological spectrum is due to the climate being favourable for growth of annuals. It is also presumed that the dominance of therophytes and nanophanerophytes may have partly resulted from disturbance in vegetation and grazing.

275. **Suri, S.K. 1984.** "A mathematical model for classifying the forest types with particular reference to Himachal Pradesh". *Indian Forester* 110(7): 603–631.

Abstract: The classification of the forest types on the basis of the floristic composition and the distribution pattern of species, in quantitative term has great potential. A mathematical model for such classification has been presented and its advantages have been described in this paper.

276. **Suyal, B.D. 2018.** "An overview of forest offences in Himachal Pradesh from 1965-66 to 2009-10: Trends in detection and manner of disposal". *Indian J. Forest.* 41(2): 161–169.

Abstract: An exercise undertaken in this article has unravelled the status of forest offences in Himachal Pradesh from 1965-1966 to 2009-2010. It brought out that a total of 10,39,172 number of forest offences (average 23093 annually) were taken cognizance of the state from 1965-1966 to 2009-2010. The highest number of offences (43901 nos.) were detected in 1975-1976 and the lowest (11869 nos.) in the year 2006-2007. Illegal felling and grazing related offences together constituted nearly 57%, forest fire related offences were less than 2% whereas the miscellaneous offences were nearly 40% of the total. The period from 1971 to 1985 experienced sharp increase in the number of forest offences, though the offences taken cognizance of were disposed off quite efficiently. The rate of disposal ranged from 71.88% to 80.13% during various time periods from 1965-1966 to 2009-2010 with overall disposal rate of 77.52%. Of the total number of offences disposed off, 9.3% of the cases were taken to Courts/authorised officers and 78.4% were disposed off by way of compounding, 13.23% remained untraced/filed. Periodic trend (5 years blocks i.e. P1 to P9) revealed 50% decline in forest offences during P9 (2005-2009) compared to what existed during P1 (1966-1970). Ironically the downturn was despite tremendous increase in human and domestic animal population in the state during same time. The success rate of the offences decided by Courts/Authorised officers ranged from 76.92% during P1 (1965-1969) to 98.9% during P9 (2005-2009) as per data published by State Forest Department. On the other hand cases registered with Police from 1988 to 2015 secured conviction rate of 12.99%.

277. **Thakur, K., Santvan, V.K. & Verma, J. 2012.** "Floristic composition and life form spectrum of Bandli Wildlife Sanctuary, district Mandi (Himachal Pradesh), India". *Pl. Archives* 12(1): 57–62.

Abstract: Floristic composition and life form spectrum of Bandli Wild Life Sanctuary (WLS), located in district Mandi of Himachal Pradesh, was studied from July, 2009 to June, 2010. Vast altitudinal variation (762-2160 amsl) and jagged topography in this Protected Area (PA) has resulted in occurrence of much diverse climate, and this is well reflected in its floristic composition. A total of 144 plant species belonging to 52 families were recorded during present course of study. Poaceae with 29 species was the most dominant family, however, as many 24 families were represented with a single species each. Life form spectrum revealed the dominance of phenerophytes (42.36%) and therophytes (33.33%) and these were followed by hemicryptophytes (18.75%), geophytes (3.47%) and chamaephytes (2.8%). Therophytes were found higher than normal biological spectrum which indicated that study area is under biotic pressure.

278. **Thakur, M., Santvan, V.K. & Nigam, A. 2012.** "Floristic composition and Biological Spectrum of Darlaghat Wildlife Sanctuary, Solan, Himachal Pradesh, India". *New York Sci. J.* 5(12): 1–14.

Abstract: Floristic composition and biological spectrum of Darlaghat Wild Life Sanctuary (DWLS), located in district Solan of Himachal Pradesh, was studied from July, 2010 to July, 2012. Vast altitudinal variation (1075-2069 amsl) and jagged topography in this Protected Area (PA) has resulted in occurrence of much diverse climate, and this is well reflected in its floristic composition. A total 302 plant species belonging to 99 families were recorded from the study area. These include: 27% trees; 24% shrubs; 35% herbs; 5% climber; 5% fern; 2% grasses and 2% Sedges. Out of the total number of 302 species Dicots were the dominant group with 87%. The Monocots were 6% with 17 species. The pteridophytes were 5 % with 14 species and gymnosperms 2% with 6 species. Fabaceae with frequency percentage of 10% was the most dominant family. However, Asteraceae 9% with second highest dominant family in the study area. Life form classes and percentage distribution was analysis showed that 302 species comprised of: - Phanerophytes: 47%, Therophytes 36%, Cryptophytes 9%, Hemicryptophytes 5% and Chamaephytes 3%. It was found that Phenerophytes percentage was approximately the same as that of normal spectrum, but Chamaephytes, Cryptophytes and Hemicryptophytes were less then the normal spectrum. However, the therophytes showed variation from normal spectrum and were significantly higher than the normal spectrum.

279. **Thakur, M., Santvan, V.K. & Nigam, A. 2013.** "Status and uses of tree flora of Darlaghat Wildlife Sanctuary, Solan (H.P.)". *Indian Forester* 138(10): 958–960.

Abstract: Present study revealed that 60 tree species were used for various purposes which include house construction, furniture, agricultural implements; for making walking sticks, musical instruments, packing cases, etc. The predominant families are fabaceae with 11 species (8 genera), Pinaceae with 5 species (3 genera), Salicaceae with 4 species (2 genera). However, Bambuaceae (3 genera), Euphorbiaceae (3 genera) and Fagaceae (2 genera) have 3 species each. Among various plants, 18 plants are predominantly used for house construction, 14 for agricultural implements, 8 for Agriculture and furniture manufacturing, 7 for agriculture and house construction, 4 plants are exclusively used only for furniture, 2 for musical instruments and packing cases each and 3 for making walking sticks.

280. **Thakur, M., Santvan, V.K. & Nigam, A. 2013.** "Phenological investigation of tree species of Darlaghat Wildlife Sanctuary, Solan, H.P.". *Asian J. Exp. Biol. Sci.* 4(3): 455–460.

Abstract: Phenological investigation of Darlaghat WildLife Sanctuary (DWLS), district Solan of Himachal Pradesh, was studied from July, 2010 to July, 2012. Vast altitudinal

variation (1075-2069 amsl) and jagged topography in this Protected Area (PA) has resulted in occurrence of much diverse climate, and this is well reflected in its phenology investigation. Sanctuary area was divided in to three altitudinal gradients i.e. hill top, mid hill and hill base. The phenodynamic analyses were made on 36 tree species from three altitudinal zone of Darlaghat wildlife Sanctuary. Detailed observations were carried out at monthly intervals over a period of two years from June 2010 to August 2012. For each tagged tree records were made of leaf initiation, leaf drop, leaf flushing, flowering, fruiting, seed formation and senescence. Different plant species from Hill top i.e. *Bauhinia* sp., *Euphorbia* sp., *Pyrus pashia*, *Pinus roxburghii*, *Ficus* sp., and *Albizzia lebbek*, *Acacia catchu*, *Cedrela toona Melia azedarach* and *Bombax cieba* from Middle hill and *Eucalyptus* sp., *Ficus roxburghii, Prunus puddum* and *Pyrus communis* were studied from Hill base. The phenological activities for each forest tree evaluated as the sum of species with different phenological stages in every month, and are represented diagrammatically in figures.

281. **Thakur, N.S., Gupta, B. & Gupta, N.K. 2012.** "Allometric estimations of biomass of important shrubs of Western Himalaya". *Indian J. Forest.* 35(2): 171–174.

Abstract: The article highlights the regression models to estimate the biomass of twelve shrubs species commonly found in the Western Himalaya. The present study was carried out in Kuthar Forest range (Kunihar Forest Division), district Solan of Himachal Pradesh. After analysis it was found that for most of the species log linear and curvilinear prediction equation gave coefficient of determination (R^2) with higher value which, show the fitness of the equation to precision. However, for species like *Leptodermis lanceolata, Justicia adhatoda, Vitex negundo* and *Mimosa himalayana*, girth and length are not good predictors for leaf biomass estimation. Thus both girth and length should be used to predict branch and total biomass estimate estimate corresponding to any girth and length. This can be done by converting girth and length to a natural logarithm. The natural logarithm of biomass in grams can then be obtained by solving the equation. After measuring the girth and length of stems and using prediction equation the precise estimate of total yield of any shrub can be obtained.

282. **Thakur, Shalu Devi, Hanief, S.M. & Chauhan, N.S. 2007.** "Multipurpose use of plant species in the Kullu valley, Himachal Pradesh (India)". *J. Non-Timber Forest Prod.* 14(2): 139–146.

Abstract: The paper presents a brief account of the multiple uses of two hundred forty one species found in the Kullu valley of Himachal Pradesh. The botanical binomial of the plants, local name with the use(s) of the plant has been provided.

283. **Thakur, V., Sehgal, R.N. & Kumari, A. 2007.** "Floristic dynamics of woody species in Chir Pine (*Pinus roxburghii*) forests along an altitudinal gradient in Himachal Pradesh". *Indian Forester* 133(9): 1185–1197.

Abstract: Floristic dynamics of a community is the indicator of variation in climate, soils, habitat, and physiography of the area. Study was conducted in the zone of occurrence (800 – 2200 m amsl) of Chir pine forests in Himachal Pradesh. Entire study area was grouped in the three altitudinal zones i.e., 900 – 1200 m, 1201 – 1500 m (Shiwalik Chir pine forests) and 1501 – 2000 m lower Himalayan Chir pine forests. It is observed that majority of the tree species showed contiguous distribution pattern, whereas, shrubs showed contiguous and random distribution. Study on density-dominance interaction showed that trees mainly showed log-normal and geometric series of distribution while in case of shrubs log series were of common. Results revealed the lower Himalayan Chir pine forests are less diverse in respect of tree species, having *Quercus leucotrichophora* dominant associate followed by *Pyrus pashia* and more diverse in case of shrubs as compared to that of shiwalik Chir pine forest where associated tree species are *Syzygium cuminii, Lannea grandis* and *Myrica esculenta* followed by *Pyrus pashia, Mallotus philippinensis* and *Cassia fistula*. Studies revealed that floristic dynamics, dominance, distribution of woody species change with change of aspects and altitudes.

284. **Uniyal, Anjali & Rawat, G.S. 2018.** "Energy-food-water; the Fundamental Provisional Services from Himalayan forests: A case study from Dhauladhar Mountain Range, North West Himalaya". *Indian J. Forest.* 41(1): 17–26.

Abstract: Provisional services from forest play a very significant role in sustaining livelihood of rural communities in the Himalayan region. Continuous flow of these services depends on the health of forest ecosystem. The present study identifies basic provisioning services flowing from a community managed forest in the Dhauladhar mountain range (North-west Himalaya) and analyses socio-ecological threats of them. Participatory rural appraisal method and structured interviews were used to collect data. Energy (fuel wood), food (fodder and wild edible plants) and water have been identified as three major provisioning services for the upstream rural communities as well as downstream urban population. A total of 98 species are used from the forests for various purposes. Socio-ecological threats identified for the sustenance of services include spread of invasive species, lack of ecological monitoring and ignorance of stakeholders.

285. **Uniyal, Anjali, Sharma, Rohit & Rawat, G.S. 2019.** "Vegetation composition and soil characteristics of a community managed forest situated in the foothills of Dhauladhar range, Western Himalaya". *Indian J. Forest.* 42(1): 15–22.

Abstract: Community managed forest in the foothills of Dhauladhar range supports the livelihhod of rural communities by supplying a range of provisioning services. However, baseline data on the vegetation composition of this forest is still lacking whici is otherwise very important to assess the status of forest in sustaining the flow of

Ecosystem Services (ES). Present study therefore aimed to quantify its vegetation structure and composition. Encroachment of *Ageratina adenophora* in the forest fringes has not only deteriorated the vegetation composition but has also affected the quality of soil leading to loss of native herbs and grasses causing decline in fodder availability for the livestock. Due to improper management measures, the invasive species is spreading fast to other interior areas. This is serious implications for the sustenance of the provisioning services for the rural people including water retaining capacity of the forest ecosystem. Hence, proper management interventions are needed for the conservation of this forest sothat the flow of ecosystem services continues for a long time.

286. **Uniyal, B.P. & Malhotra, C.L. 1983.** "Contribution to the flora of Una district (Himachal Pradesh). *J. Econ. Taxon. Bot.* 4(3): 839–859, 7: 240–242.

287. **Verma, A. & Sharma, S.K. 2012.** "Preliminary survey of angiospermic flora of Kangra district (H.P.), India". *Indian J. Pl. Sci.* 1(1): 110–113.

288. **Verma, J., Sembi, J.K. & Pathak, Promila. 2015.** "Lesser known orchids of Himachal Pradesh (Northwest Himalaya): II- Genus *Galearia* Raf. and *Ponerorchis* Rchb.f.". *J. Orchid Soc. India* 29: 103–108.

Abstract: Genus *Galearis* Raf. is represented by a single [*G. spathulata* (Lindl.) P.F. Hunt] and *Ponerorchis* Rchb. f. by two [*P. chusua* (D. Don) Soó, *P. nana* (King and Pantl.) Soó] species in Himachal Pradesh, North-West Himalaya. These species occupy open grasslands at higher altitudes beyond 3000 m amsl in Chamba, Lahaul and Spiti, Shimla, and Sirmaur districts of the state. Present communication provides information on their taxonomy, habitat characteristics, distribution, and flowering and fruiting periods. A brief note is also provided on possible threats and conservation of these orchids.

289. **Verma, J., Thakur, K. & Vij, S.P. 2013.** "On the occurrence of an interesting leafless orchid *Neottia listeroides* Lindl. in Himachal Pradesh, Northwestern Himalaya, India". *J. Threatened Taxa* 5(11): 4601–4603.

Abstract: Field explorations in Himachal Pradesh (2002-2010) have resulted in documenting some new distributional records of orchids for the state. They exhibited a variety of life forms (epiphytes/terrestrials/lithophytes) and are mostly distributed in the temperate hills. Present communication provides notes on taxonomy, distribution, habitat ecology and conservation of *Neottia listeroides* Lindl., an interesting leafless orchid in the state.

290. **Verma, J., Thakur, K., Santwan, V.K. & Vij, S.P. 2011.** "Orchids of Bandli Wild Life Sanctuary, Himachal Pradesh, Northwest Himalaya". *J. Orchid Soc. India* 25(1-2): 29–32.

Abstract: The paper deals with diversity, distribution pattern, phyto-associates and conservation of orchids at Bandli Wild Life Sanctuary (WLS), Himachal Pradesh, North

West Himalaya. Vast altitudinal variation (750-2160 m amsl) in this Protected Area (PA) has resulted in occurrence of 9 ground growing orchid species that are chiefly distributed between 1100-2000 m altitude. *Habenaria* with 4 species is the best represented genus and is followed by *Herminium* (2 species), and *Epipactis, Gastrodia* and *Nervilia* (1 species each). Majority of the orchids occupy either steep grassy slopes or narrow open hilltops with scattered trees and shrubby elements; only *Habenaria marginata* was recorded from a low altitude locality along the sides of a seasonal water channel. Collection of fuel wood and fodder, and grazing are main anthropogenic activities that might affect normal growth and regeneration of orchids in the sanctuary.

291. **Verma, J., Thakur, K., Sharma, Kusum, Sembi, J.K. & Pathak, Promila. 2018.** "Leaf micromorphology of some *Habenaria* Willd. *sensu lato* (Orchidaceae) species from Western Himalaya". *J. Orchid Soc. India* 32: 103–112.

Abstract: Leaf external characteristics were investigated in twelve Western Himalayan species of *Habenaria* Willd. *sensu lato* with a view to aseess their taxonomic and ecological importance. The leaves in all species investigated were soft, shiny and devoid of trichomes. The epidermal cells were polygonal in shape but quadrilateral on adaxial surface of *H. edgeworthii* J.D. Hook. Cell walls were straight except on abaxial epidermis of *H. commelinifolia* (Roxb.) Wall. ex Lindl. and *H. ensifolia* Lindl., where they were slightly undulated. The leaves were invariably hypostomatic and possessed anomocytic type of stomata. Additional presence of diacytic (*H. plantaginea* Lindl.) and twin (*H. marginata* Colebr.) stomata was of taxonomic implication. Stomatal frequency (per mm^2) was lowest (16.01±1.09) in *H. edgeworthii* and highest (56.84±3.50) in *H. marginata*, and stomatal index (%) ranged between 11.93±1.14 (*H. stenopetala* Lindl.) and 27.24±1.26 (*H. aitchisonii* Rechb.f.). Leaf epidermal features reflected no apparent relationship with species habitat. There were significant differences observed in many epidermal characteristics, which can ably supplement the data available on gross morphology to help in delimiting different *Habenaria* species.

292. **Verma, J., Sembi, J.K., Thakur, K., Pathak, Promila & Vij, S.P. 2009.** "Epiphytic Orchids in Himachal Pradesh". *J. Orchid Soc. India* 23(1-2): 49–61.

Abstract: Epiphytic orchids are represented by ten species, viz., *Aeridis multiflora* Roxb., *Dendrobium amoenum* Lindl., *Eria alba* Lindl., *Gastrochilus calceolaris* (Buch.-Ham. ex Sm.) D. Don, *Luisia zeylanica* Lindl., *Pholidota articulata* Lindl., *Rhynchostylis retusa* Bl., *Thunia bracteata* (Roxb.) Schltr., *Vanda cristata* Lindl., and *V. testacea* (Lindl.) Reichb. f. in Himachal Pradesh. Besides brief description, this paper deals with distribution pattern and host preferences of these species in the state. Factors threatening their survival have been identified and conservation measures suggested.

293. **Verma, Rachna, Tatwal, A., Kumar, D. & Puri, S. 2019.** "Assessment of antimicrobial potential and phytochemical profiling of ethnomedicinal plant *Bergenia ciliata* (Haw.) Sternb. in Western Himalaya". *J. Microbiol. Biotechnol. & Food Sci.* 9(1): 15–20.

Abstract: Western Himalaya is endowed with rich treasure of medicinal plant wealth. *Bergenia ciliata* is one of the important ethnomedicinal plants collected from Western Himalaya and used for dissolving kidney stones by the local inhabitants. In present work ethanolic rhizome extract of plant was evaluated for its medicinal potential by assessing its antimicrobial and phytochemical properties. In antimicrobial studies the ethanolic rhizome extract of the plant was used against standard and clinical isolates of selected pathogenic bacterial strains. Maximum inhibition zone (12±1.0 mm) was observed against clinical isolate of *S. typhimurium* followed by clinical isolate of *E. coli* with an inhibition zone of 11.33±0.57 mm. The MIC of *B. ciliata* rhizome extract ranged from 100 to 200ìg/100 ìl against different pathogenic strains. The rhizome extract showed presence of reducing sugars, alkaloids, saponins, tannins, flavonoids and cardiac glycosides. Further, GC-MS analysis of rhizome extract confirmed the presence of phytochemicals viz., beta sitasterol, ethyl iso-allocholate, hexadecanoic acid, cetene, monolinolein TMS, berginin, gallic acid, linolool, â-caryophyllene, calcitriol, carotene, oleic acid and astaxanthin with significant ethnomedicinal importance.

294. **Verma, R.K. 2014.** "Floristic diversity along an altitudinal gradients in Hango valley of Cold Desert in district Kinnaur, Himachal Pradesh". *Biol. Forum- An Int. J.* 6(2): 115–126.

Abstract: Cold deserts-a unique ecosystem in itself, lies in the lap of Himalayas, which is quite fragile and sensitive. The biotic pressure on this particular ecosystem as exerted by increasing human and cattle population coupled with over exploitation has resulted in its ecological degradation. Accordingly, a study was conducted to understand the floristic diversity along an altitudinal gradient with elevations varying from 3400 m to 5000 m above msl in Hango valley falling in cold desert area of district Kinnaur, Himachal Pradesh. Total number of plant species was 130 belonging to 41 families and 101 genera. The dominant families were Asteraceae, Polygonaceae, Ranunculaceae, Lamiaceae and Umbelliferae. Number of tree species at 3400- 3800 m elevation was 3 with the dominance of *Salix alba*. The number of shrubs species were 9, 5, 3 and 2 with the dominance of *Rosa webbiana, Cotoneaster microphyllus, Juniperus indica* and *Rhododendron anthopogon* in the elevations of 3400-3800 m, 3800-4200 m, 4200-4600 m and 4600-5000 m respectively. The number of herb species were 73, 63, 36 and 30 at 3400-3800 m, 3800-4200 m, 4200-4600 m and 4600-5000 m elevation respectively. *Heracleum candicans* was dominant at 3400-3800 m elevation and *Bergenia stracheyi* was dominant herbs at 3800-4200 m, 4200-4600 m and 4600-5000 m elevation on the basis of Importance Value Index. The distribution pattern of most the plant species was contiguous in all the altitudinal ranges.

Index of diversity for herb species in different elevation ranges was 3.82, 3.51, 3.20 and 3.18. The richness and evenness index was comparatively more in lower altitudinal ranges than higher altitudinal ranges indicating that species are evenly distributed in lower elevations. Index of similarity calculated for shrub and herb species indicating more dissimilarity of species between different altitudes. Out of 62 medicinal plant species recorded from the area, 18 species i.e. *Aconitum violaceum, Arnebia euchroma, Bergenia stracheyi, Dactylorhiza hatagirea, Ephedra gerardiana, Ferula jaschkeana, Hippophae rhamnoides, Hyoscyamus niger, Hyssopus officinalis, Juniperus polycarpos, Meconopsis aculeata, Pleurospermum candollei, Rheum webbianum, Rhodiola heterodonta, Rhododendron anthopogon, Rhododendron campanulatum, Saussurea obvallata* and *Saussurea gossypiphora* fall in the category of threatened plants. The better conservation of natural resources can be done through promotion of community based conservation, in-situ conservation through the establishment of nature reserves, *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting of regular training on the procedure of medicinal plants collection and processing among the end users.

295. **Verma, R.K. 2014.** "Altitudinal gradient affecting floristic diversity in Shingan valley of Rakchham-Chitkul Wildlife Sanctuary, district Kinnaur, Himachal Pradesh". *Biol. Forum- An Int. J.* 8(1): 540–547.

Abstract: A study to understand and assess the impact of altitudinal gradientson the floristic diversity in Shingan valley falling in Rakchham-Chitkul Wildlife Sanctuary, district Kinnaur, Himachal Pradesh was carried out during the year 2008. The altitudinal gradient in the resent case varied from 2800 m to 4300 m above msl. Total number of plant species as recorded was 118 belonging to 46 families and 87 genera. The dominant families registered were Rosaceae, Asteraceae, Lamiaceae, Ranunculaceae and Polygonaceae. The number of tree species was 11 and 4 with the dominance of *Pinus wallichiana* and *Betula utilis* at 2800-3300 m and 3300-3800 m elevation respectively. The number of shrub species was 15, 13 and 6 with the dominance of *Salix fragilis, Juniperus indica* and *Rhododendron anthopogon* at the elevation of 2800-3300 m, 3300-3800 m and 3800-300 m. The number of herb species was 63, 55 and 40 at 2800-3300 m, and 3300-3800 m and 3800-4300 m elevation respectively. *Caltha palustris, Anaphalis triplinervis* and *Thymus linearis* were the dominance shrub at these elevations respectively. The distribution pattern of species was mostly contiguous in all the altitudes ranges. Index of diversity for herb species in different elevation ranges was 3.75, 3.66 and 3.44 for 2800-3300 m, 3300-3800 m and 3800-4300 m elevation respectively. Out of 58 medicinal plant species as recorded from the valley, 14 species like *Dactylorhiza hatagirea, Angelica glauca, Betula utilis, Podophyllum hexumdrum, Picrorrhiza kurrooa, Rheum australe, Rheum webbiana, Taxus*

wallichiana, Herecleum lanatum, Polygonatum verticillatum, Rhodiola heterodonta, Rhododendron anthopogon, Rhododendron campanulatum, Rhododendron lepidotum etc. fall in the category of threatened plants as per IUCN categorization.

296. **Verma, R.K. 2015.** "Plant diversity along an altitudinal gradient in Kalatop beat of Kalatop Khajjar Wildlife Sanctuary of district Chamba, Himachal Pradesh". *Indian J. Forest.* 38(1): 17–27.

Abstract: Plant diversity study conducted at an altitudinal gradient varying from 1800-2400 m above msl in Kalatop beat of the sanctuary revealed that the total number of plant species was 142 belonging to 71 families and 127 genera. The dominant families were Asteraceae, Rosaceae, Fabaceae, Ranunculaceae and Polygonaceae. The number of tree species was 7, 9 and 12 with the dominance of *Cedrus deodara* at 1800-2000 m, 2000-2200 m, 2200-2400 m elevation ranges respectively. The number of shrub species was 26, 27 and 24 with the dominance of *Berberis lyceum, Sarcococca saligna* and *Sarcococca saligna* at 1800-2000 m, 2000-2200 m and 2200-2400 m elevation respectively. The number of herb species was 59, 74 and 75 with the dominance of *Berginia ciliata, Pilea scripta* and *Valeriana jatamansi* at 1800-2000 m, 2000-2200 m and 2200-2400 m elevation ranges respectively. The distribution pattern of most of the plant species was contiguous in all altitudes. Index of diversity for herb species in these elevation ranges was 3.750, 3.674 and 3.472. Out of 63 medicinal plant species recorded from the area, 4 species viz., *Podophyllum hexandrum, Taxus wallichiana, Polygonatum verticillatum* and *Zanthoxylum armatum* fall in the threatened category. The better conservation of natural resources can be done through promotion of community based conservation, *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting of regular training on the procedure of medicinal plants collection and processing among the end users.

297. **Verma, R.K. 2016.** "Floristic diversity along an altitudinal gradient in Lakadmandi beat of Kalatop Khajjar Wildlife Sanctuary of district Chamba, Himachal Pradesh". *Indian J. Forest.* 39(2): 101–110.

Abstract: A study was conducted to understand the floristic diversity along an altitudinal gradient with elevations varying from 1800-2400 m above msl in Lakadmandi beat of Kalatop Khajjar Wildlife Sanctuary of district Chamba, Himachal Pradesh during 2011. Total number of plant species was 81 belonging to 52 families and 76 genera. The dominant families were Asteraceae, Rosaceae, Pinaceae and Polygonaceae. The number of tree species was 6, 6 and 10 with the dominance of *Quercus leucotrichophora, Cedrus deodara* and *Cedrus deodara* at 1800-2000 m, 2000-2200 m, 2200-2400 m elevation ranges respectively. The number of shrub species was 16, 13 and 23 with the dominance of *Quercus leucotrichophora* sapling, *Sarcococca saligna*

and *Sarcococca saligna* at 1800-2000 m, 2000-2200 m and 2200-2400 m elevation respectively. The number of herb species was 46, 46 and 58 at 1800-2000 m, 2000-2200 m and 2200-2400 m elevation ranges respectively. On the basis of Importance Value Index (IVI), *Valeriana jatamansi* was the dominant herb at 2000-2200 m and 2200-2400 m elevation ranges respectively. The distribution pattern of most of the plant species was contiguous at all altitudinal ranges. Index of diversity for herb species in these elevation ranges was 3.420, 3.568 and 3.250. Out of 40 medicinal plant species recorded from the area, 3 species viz., *Paris polyphylla, Podophyllum hexandrum*and *Taxus wallichiana*fall in the category of threatened plants. The better conservation of natural resources can be done through promotion of community based conservation, *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting of regular training on the procedure of medicinal plants collection and processing among the end users.

298. **Verma, R.K. 2016.** "Status of plant diversity along an altitudinal gradient in Dankund Beat of Kalatop Khajjiar Wild Life Sanctuary of district Chamba, Himachal Pradesh". *Biol. Forum- An Int. J.* 8(1): 540–547.

Abstract: A study was conducted to understand the plant diversity along an altitudinal gradient with elevations varying from 2200-2600 m above msl in Dankund beat of Kalatop Khajjiar wild life sanctuary in district Chamba, Himachal Pradesh during 2011. Total number of plant species was 102 belonging to 54 families and 95 genera. The dominant families were Asteraceae, Rosaceae, and Fabaceae. The number of tree species at 2200-2400 m and 2400-2600 m was 12 and 4 with dominance of *Cedrus deodara* and *Picea smithiana* respectively. The number of shrub species was 27 and 10 with the dominance of *Sorbaria tomentosa* and *Vibernum erubescens* in the elevation of 2200-2400 m and 2400-2600 m respectively. The number of herb species was 52 and 53 with the dominance of *Valeriana jatamansii* and *Erigeron multiradiatus* respectively. The distribution pattern of most of the plant species was contiguous in both the altitudes. Index of diversity for herb species was 3.167 and 3.200 for 2200-2400 m and 2400-2600 m elevation ranges respectively. Out of 35 medicinal plant species recorded from the area, 3 species i.e. *Dioscorea deltoidea, Paris polyphylla* and *Taxus wallichiana* fall in the category of threatened plants. The better conservation of natural resources can be done through promotion of community based conservation, *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting of regular training on the procedure of medicinal plants collection and processing among the end users.

299. **Verma, R.K. 2017.** "Phyto-diversity studies in Kanasa Valley of Rakchham Chitkul Wild life Sanctuary of district Kinnaur, Himachal Pradesh". *Biol. Forum- An Int. J.* 9(1): 62–69.

Abstract: A study was carried out in Kanasa valley of Rakchham Chitkul wild life sanctuary of district Kinnaur, Himachal Pradesh to understand the phytodiversity along the altitudinal gradients with elevations varying in between 3000 m to 3800 m above msl during 2009-2010. Analysis of the data revealed that the composition of vegetation in Kanasa valley of the sanctuary showed the presence of total number of 130 plant species belonging to 43 families and 94 genera. The dominant families recorded were Rosaceae, Asteraceae, Ranunculaceae, Ploygonaceae and Lamiaceae. The maximum number of tree species recorded along the altitudinal gradient was 8 with the dominance of *Pinus wallichiana* at 3000 m-3400 m and *Abies pindrow* at 3400 m-3800 m respectively. The number of shrub species recorded were 17 and 16 in the elevation of 3000 m- 3400 m and 3400-3800 m having dominance of *Rhododendron campanulatum* at both the elevations. The number of herbs species recorded were 77 and 73 with the dominance of *Nepeta laevigata* at 3000m-3400 m and *Anaphalis contorta* at 3400 m-3800 m elevations. The distribution pattern of species was mostly contiguous in the both the altitudinal ranges. Index of diversity for herb was 3.91 and 3.72 for 3000 m-3400 m and 3400 m- 3800 m elevations respectively. Out of 52 medicinal plant species recorded from the area, 10 species viz; *Aconitum heterophyllum, Saussurea obvallata, Betula utilis, Meconopsis aculeata, Picrorhiza kurrooa, Taxus wallichiana, Aconitum violaceum, Heracleum lanatum, Polygonatum verticillatum, Rheum webbianum, Rhodiola heterodonta* and *Rhododendron anthopogon* fall in the category of threatened plants. Keeping in view the diversity and the threat status of the species, conservation of natural resources through promotion of community based *in-situ* conservation has been stressed upon. *Ex-situ* conservation through tissue culture, development of suitable agro-techniques and conducting regular trainings on the procedure of medicinal plants collection, their processing amongst the end users have also been advocated.

300. **Verma, R.K. 2017.** "Assessment of vegetation along an altitudinal gradient in Reunsi Beat of Shikari Devi Wild Life Sanctuary of district Mandi, Himachal Pradesh". *Biol. Forum- An Int. J.* 9(2): 1–9.

Abstract: A study was carried out in Reunsi beat of Shikari Devi wild life sanctuary of district Mandi, Himachal Pradesh during 2015-2016 to know the composition of vegetation along an altitudinal gradient with elevations varying from 2000-3200m. Total number of plant species was 167 belonging to 49 families and 91 genera. The dominant families were Rosaceae, Compositae, Pinaceae, Labiatae, Ploygonaceae and Leguminosae. The number of tree species at 2000-2400 m, 2400-2800 m and 2800-3200 m elevation was 9, 11 and 4 with the dominance of *Cedrus deodara, Cedrus deodara* and *Quercus semecarpifolia* respectively. The number of shrub species was 12, 18 and 6 with the dominance *Sarcococca saligna, Sarcococca saligna* and

Cotoneaster microphyllus at 2000-2400 m, 2400-2800 m and 2800-3200 m elevation respectively. The number of herbs species was 35, 50 and 23 with the dominance of *Oplismenus compositus, Gypsophila cerastioides* and *Potentilla atrosanguinea* at 2000-2400 m, 2400-2800 m and 2800-3200 m elevation respectively. The distribution pattern of species was mostly contiguous in all altitude ranges. Index of diversity for herb in different elevation ranges was 3.16, 3.41 and 2.75 respectively. Out of 56 medicinal plant species recorded from the area, 2 species i.e. *Polygonatum verticillatum* and *Taxus wallichiana* fall in the category of threatened plants. The better conservation of natural resources can be done through promotion of community based conservation, *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting of regular training on the procedure of medicinal plants collection and processing among the end users.

301. **Verma, R.K. & Kapoor, K.S. 2009.** *Plant Wealth in Cold Desert: Kinnaur, Himachal Pradesh*. HFRI, Shimla (H.P.).

302. **Verma, R.K. & Kapoor, K.S. 2010.** "Assessment of floristic diversity in Pooh Valley of Cold deserts of district Kinnaur, Himachal Pradesh". *Biol. Forum- An Int. J.* 2(1): 35–44.

Abstract: Assessment of floristic diversity provide basis for devising suitable strategies for conservation of the plant resources. Accordingly, a study was conducted to understand the floristic diversity along an altitudinal gradient with elevations varying from 2700 m to 4200 m above msl in Pooh area falling in cold desert area of Pooh sub division of district Kinnaur, Himachal Pradesh during 2007. The total number of plant species in this valley was 192 belonging to 55 families and 136 genera. The dominant families were Asteraceae, Rosaceae, Lamiaceae and Polygonaceae. The number of tree species at 2700-3200 m and 3200-3700 m was 13 and 5 with dominance of *Salix alba* and *Juniperus polycarpos* respectively. The number of shrub species was 22, 15 and 11 in the elevation of 2700-3200 m, 3200-3700 m and 3700-4200 m respectively. *Rosa webbiana* was dominant shrub at 2700-3200 m and 3200-3700 m where as *Juniperus indica* was dominant at 3700-4200 m elevation. The number of herb species was 83, 77 and 72 with the dominance of *Artemisia scoparia, Origanum vulgare* and *Bergenia stracheyi* respectively. The distribution pattern of most of the plant species was contiguous in all the altitudes. Index of diversity for herb species was 3.89, 3.86 and 3.81 for 2700-3200 m, 3200-3700 m and 3700-4200 m elevation ranges respectively. The Index of similarity for shrub and herb species between different altitudes was low indicates remarkable degree of dissimilarity in plant species between different altitudes. Out of 62 medicinal plant species as recorded from the area, 10 species fall in the category of threatened plants. The better conservation of natural resources can be well achieved through promotion of community based conservation stressing *in-situ* conservation through the establishment

of nature reserves and *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting regular trainings on the procedure of medicinal plants collection, processing amongst the end users/the local people, traders and real stake holders.

303. **Verma, R.K. & Kapoor, K.S. 2010.** "Phyto-sociological studies in Hitch Valley of Rakchham Chitkul Wildlife Sanctuary of district Kinnaur, Himachal Pradesh". *Biol. Forum-An Int. J.* 2(2): 94–104.

304. **Verma, R.K. & Kapoor, K.S. 2011.** "Plant species diversity in Ropa-Giavung Valley in Cold Deserts of district Kinnaur, Himachal Pradesh". *Biol. Forum- An Int. J.* 3(2): 34–43.

Abstract: A study was conducted to understand the plant diversity along an altitudinal gradient with elevations varying from 3000 m to 5000 m above msl in Ropa- Giavung valley falling in cold desert area of Pooh sub division of district Kinnaur, Himachal Pradesh during 2008. The total number of plant species was 160 belonging to 51 families and 119 genera. The dominant families were Asteraceae, Polygonaceae, Rosaceae and Ranunculaceae. The number of tree species at 3000-3500 m was 12 with the dominance of *Pinus gerardiana*. The number of shrub species were 20 and 15 in the elevations of 3000-3500 m and 3500-4000 m respectively. *Rosa webbiana* and *Juniperus indica* taking shape of the dominant shrub at 3000-3500 m and 3500-4000 m elevations respectively. The number of herb species were 83, 46, 44 and 30 at 3000-3500 m, 3500-4000 m, 4000-4500 m and 4500-5000 m elevational ranges respectively. On the basis of Importance Value Index (IVI), *Ephedra gerardiana, Artemisia brevifolia, Bistorta affinis* and *Potentilla argyrophylla* were the dominant herbs dotting different elevational ranges and distribution pattern of plant species was mostly contiguous in all the altitudes. Index of diversity for herb species in different elevational ranges was 3.97, 3.54, 3.16 and 2.98. Index of similarity for herb species between different altitudes was low indicating more dissimilarity of species between different altitudes.

305. **Verma, R.K. & Kapoor, K.S. 2011.** "Status of plant species diversity along an altitudinal gradient in Murti Panag Valley of Rakchham-Chitkul Wildlife Sanctuary in district Kinnaur, Himachal Pradesh". *Environm. & Ecol.* 29(2): 613–622.

306. **Verma, R.K. & Kapoor, K.S. 2012.** "Plant diversity in Alpine area of Kalatop-Khajjiar Wildlife Sanctuary of district Chamba, Himachal Pradesh". *Environm. & We* 7(1): 1–7.

Abstract: A study was conducted to understand the plant diversity along an altitudinal gradient with elevations varying from 2400-2625 m above msl in alpine area of Dainkund in Kalatop-Khajjiar Wildlife Sanctuary of district Chamba, Himachal Pradesh during 2010. Total number of plant species was 61 belonging to 34 families and 60 genera. The dominant families were Asteraceae, Rosaceae and Ranunculaceae.

307. **Verma, R.K. & Kapoor, K.S. 2013.** "Floristic diversity along an altitudinal gradient in Namgia Valley of Cold Desert in district Kinnaur, Himachal Pradesh". *Indian Forester* 139(3): 202–211.

Abstract: A study was carried out to know the floristic diversity along an altitudinal gradient with elevations varying from 3000 m to 5000 m above msl in Namgia valley falling in cold desert area of district Kinnaur, Himachal Pradesh during 2007. Total number of plant species was 142 belonging to 49 families and 105 genera. The dominant families were Asteraceae, Polygonaceae, Ranunculaceae and Rosaceae. The number of tree species at 3000-3500 m elevation was 8 with the dominance of *Populus nigra*. The number of shrub species were 17, 8, 6 and 2 at the elevation of 3000-3500 m, 3500-4000 m, 4000-4500 m and 4500-5000 m respectively while number of herb species were 72, 62, 42 and 32 species at the same elevations. *Juniperus communis* taking shape of dominant shrub at 3500-4000 m and 4000-4500 m elevations. *Ephedra gerardiana* was dominant herb at 3000-3500 m and 3500-4000 m elevations. The distribution pattern of most of the plant species was contiguous in all altitudes. Index of diversity for herb species at different elevations ranges was 3.56, 3.25, 3.14 and 3.04. Out of 64 medicinal plant species recorded from the area, 13 species fall in the threatened category.

308. **Verma, R.K. & Kapoor, K.S. 2013.** "Analysis of plant diversity along an altitudinal gradient in Lippa-Asrang Valley of Cold Desert in district Kinnaur, Himachal Pradesh". *Indian J. Forest.* 36(1): 61–74.

Abstract: A study was conducted to understand the plant diversity along an altitudinal gradient with elevations varying from 2750 m to 5000 m above msl in Lippa-Asrang valley falling in cold desert area of Pooh sub-divisionof district Kinnaur, Himachal Pradesh during 2007. Thenumber of tree species at 2750-3200 m and 3200-3650 m elevations were 10 and 8 with the dominance of *Cedrus deodara* and *Pinus wallichiana* respectively. The number of shrub species were 19, 17, 7 and 3 in the elevation of 2750-3200 m, 3200-3650 m, 3650-4100 m and 4100-4550 m respectively. *Juniperus communis* taking shape of the dominant shrub at 2750-3200 m, 3200-3650 m and 3650-4100 m elevations. *Rhododendron anthopogon* was the dominant shrub at 4100-4550 m elevation range. The number of herb species were 76, 73, 46, 39 and 33 species at 2750-3200 m, 3200-3650 m, 3650-4100 m and 4100-4550 m elevational range respectively. On the basis of importance value index (IVI), *Artemisia brevifolia, Heracleum candicans, Thymus linearis, Bergenia stracheyi* and *Bistorta affinis* were the dominant herbs dotting different elevational ranges and distribution pattern of plant species was mostly contiguous in all altitudes. Index of diversity for herb species in different elevational ranges was 3.89, 3.82, 3.47, 3.21 and 2.95. Out of 78 medicinal plant species recorded from the area, 20 species fall in the category of threatened

plants. The better conservation of natural resources can be well achieved through promotion of community based conservation stressing, *in-situ* conservation through the establishment of nature reserves and *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting regular trainings on the procedure of medicinal plants collection, processing amongst the end users/the local people, traders and real stakeholders.

309. **Verma, R.K. & Kapoor, K.S. 2014.** "Status of plant diversity in Alpine area of Rakchham-Chitkul Wildlife Sanctuary of district Kinnaur, Himachal Pradesh". *Biol. Forum-An Int. J.* 6(1): 5–12.

Abstract: A study was conducted to understand the plant diversity along an altitudinal gradient with elevations varying from 3700 m to 4700 m above msl in alpine area of Rani Kanda in Rakchham Chitkul wildlife sanctuary in district Kinnaur, Himachal Pradesh during 2009. Total number of plant species was 102 belonging to 31 families and 66 genera. The dominant families were Asteraceae, Rosaceae, Ploygonaceae, Lamiaceae, Scrophulariaceae and Ranunculaceae. The number of shrub species was 5 and 4 at elevation of 3700-4200 m and 4200-4700 m with the dominance of *Juniperus indica* at both the elevation. The number of herbs species was 81 and 62 at 3700-4200 m and 4200-4700 m with the dominance of *Thymus linearis* at both the elevation. The distribution pattern of most of species was contiguous. Index of diversity for herb was 3.54 and 3.66 in these elevations respectively. Out of 50 medicinal plant species recorded from the area, 14 species i.e., *Betula utilis, Meconopsis aculeata, Picrorhiza kurrooa, Heracleum lanatum, Polygonatum multiflorum, Polygonatum verticillatum, Podophyllum hexandrum, Selinum tenuifolium, Rheum australe, Rheum webbianum, Rhodiola heterodonta, Rhododendron anthopogon, Rhododendron campanulatum* and *Saussurea obvallata* fall in the category of threatened plants.

310. **Verma, R.K. & Kapoor, K.S. 2016.** "Assessment of vegetation along an altitudinal gradient in Khajrot beat of Kalatop Khajjar Wildlife Sanctuary of district Chamba, Himachal Pradesh". *Indian J. Forest.* 39(1): 1–8.

Abstract: A study was conducted to assess the composition of vegetation along an altitudinal gradient with elevations varying from 1900-2300 m m above msl in Khajrot beat of Kalatop Khajjar Wildlife Sanctuary of district Chamba, Himachal Pradesh during 2011. Total number of plant species was 105 belonging to 60 families and 95 genera. The dominant families were Asteraceae, Rosaceae, Polygonaceae, Lamiaceae andPinaceae. The number of tree species at 1900-2100 m, 2100-2300 m elevation was 14 and 10 with the dominance of *Picea smithiana* at both the altitudes. The number of shrub species was 23 and 19 with the dominance of *Sarcococca saligna* at both the elevations. The number of herb species was 61 and 54 with the dominance of *Valeriana jatamansi* at 1900-2100 m, and 2100-2300 m elevation ranges

respectively. The distribution pattern of most of the plant species was contiguous in all altitudinal ranges. Index of diversity for herb species in differnt elevation ranges was 3.301 and 3.334. Out of 50 medicinal plant species recorded from the area, 3 species viz., *Dioscorea deltoidea, Polygonatum verticillatum* and *Paris polyphylla*fall in the category of threatened plants. The better conservation of natural resources can be done through promotion of community based conservation, *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting of regular training of the procedure of medicinal plants collection and processing among the end users.

311. **Verma, R.K. & Kapoor, K.S. 2017.** "Estimation of biomass and soil carbon stock in mixed forest of *Abies pindrow* Royle- *Picea smithiana* (Wallich) Boiss and *Betula utilis* D. Don forests of district Shimla, Himachal Pradesh". *Indian J. Forest.* 40(2): 117–120.

Abstract: A study was conducted to estimate the biomass and soil carbon stock in various sites of *Abies pindrow* (Silver fir)- *Picea smithiana* (Spruce) and *Betula utilis* (Bhojpatra) forests of district Shimla, Himachal Pradesh during the year 2014-2015. In Fir-Spruce mixed forests, the amount of carbon stock at Larot site for above ground, below ground, under storey and litter was 287.39 tC/ha, 57.48 tC/ha, 2.22 tC/ha and 0.92 tC/ha respectively. Whereas, values of these components at Khirki site were 267.31 tC/ha, 53.46 tC/ha, 3.65 tC/ha and 0.85 tC/ha respectively. The biomass as well as the carbon stock was higher at Larot site than Khirki site. The sil organic carbon stock (tC/ha) at 10-15 cm, 15-30 cm and 30-45 cm was 27.05, 24.91 and 18.35 respectively at Larot site. Whereas, these values for different depths were 27.36 tC/ha, 22.02 tC/ha and 19.01 tC/ha respectively for Khirki site. The value of total soil carbon stock was little more (70.31 tC/ha) at Larot site tha Khirki site (68.39 tC/ha). In case of Bhojpatra forests, the amount of carbon stock at Larot site for above ground level, below ground level, under storey and litter was 75.32 tC/ha, 18.83 tC/ha, 11.38 tC/ha and 1.57 tC/ha respectively. In Bhojpatra forest, understorey i.e. biomass of shrubs and herbs contribute about 11.63% to the total biomass in the forest. In soil organic carbon stock (tC/ha) at 10-15 cm, 15-30 cm and 30-45 cm was 19.54, 15.43 and 11.88 respectively for this site. The soil organic carbon stock decreased with increasing the soil depth.

312. **Verma, R.K. & Kapoor, K.S. 2017.** "Floristic diversity along an altitudinal gradient in Bharmeri beat of Shikari Devi Wildlife Sanctuary of district Mandi, Himachal Pradesh". *Indian J. Forest.* 40(4): 363–369.

Abstract: A study was conducted to understand the floristic diversity along an altitudinal gradient with elevations varying from 2500-3100 m above msl in Bharmeri beat of Shikari Devi Wildlife Sanctuary in district Mandi, Himachal Pradesh during 2015-2016. Total number of plant species was 127 belonging to 46 families and 86 genera.

The dominant families were Labiateae, Rosaceae, Compositae and Pinaceae. The number of tree species was 6 and 5 with the dominance of *Cedrus deodara* and *Quercus semecarpifolia* at 2500-2800 m and 2800-3100 m elevation respectively. The number of shrub species was 12 and 7at the elevation of 2500-2800 m and 2800-3100 m having dominance shrub *Prinsepia utilis* and *Cotoneaster microphyllus* respectively. The number of herb species was 47 and 50 with the dominance of *Valeriana jatamansi* and *Anaphalis triplinervis* at 2500-2800 m, and 2800-3100 m elevation respectively. The distribution pattern of mostly contiguous in the both altitudel ranges. Index of diversity for herb in these elevation ranges was 3.34 and 3.44 respectively. Out of 53 medicinal plant species recorded from the area, 3 species viz., *Berginia stracheyi, Polygonum verticillatum* and *Taxus wallichiana* fall in the category of threatened plants. The better conservation of natural resources can be done through promotion of community based conservation, *ex-situ* conservation through tissue culture, developing cultivation technologies and nurseries of medicinal plants and conducting of regular training on the procedure of medicinal plants collection and processing among the end users.

313. **Verma, R.K., Jishtu, V., Kapoor, K.S. & Kumar, Surinder. 2008.** "Plant diversity in alpine pasture of Talra Wildlife Sanctuary of district Shimla, Himachal Pradesh". *Indian J. Forest*. 31(1): 13–18.

Abstract: Studies to evaluate the plant diversity and growth forms in alpine pastures of Talra Wildlife Sanctuary of district Shimla, Himachal Pradesh were carried out during August, 2003. Total 75 species of plant, comprising of 7 grasses, 4 sedges, 4 leguminous forbs and 60 non-leguminous forbs were recorded from the area. On the basis of Importance Value Index (IVI), *Sibbaldia cuneata* O. Ktze was found to be the dominant species followed by *Geum elatum* Wall. ex D. Don, *Ligularia amplexicaulis* DC., *Primula denticulata* Smith and *Saxifraga parnassifolia* D. Don. The distribution of all the plant species was contagious. Index of dominance was 0.036 and index of diversity 5.386. The contribution of tall forbs, short forbs and cushioned and spreading forbs in the alpine pasture was 29.33%, 54.66% and 16.0% respectively.

314. **Verma, R.K., Jishtu, V., Kapoor, K.S. & Subramani, S.P. 2003.** "Assessment of plant species diversity in in *Betula utilis* D. Don in Cold Arid region of Himachal Pradesh". *Environm. & Ecol.* 21(4): 922–927.

Abstract: Studies were conducted during August 2000 to evaluate the plant diversity and chemical properties (pH, electrical conductivity, organic carbon, and N, P, K availability) of *Betula utilis* forest soil in cold arid zone of Himachal Pradesh, India. The number of ground flora species as recorded within and outside the forest area were 38 and 14, respectively. On the basis of importance value index, *Anaphalis royleana* was the dominant species within and outside the forest areas.

315. **Verma, R.K., Jishtu, V., Kapoor, K.S. & Subramani, S.P. 2003.** "Analysis of plant diversity in Man Lunga valley and Khamengar valley of Pin Valley National Park, Himachal Pradesh". *Environm. & Ecol.* 21(4): 941–946.

Abstract: The present paper deals with the species diversity, distribution pattern, concentration of dominance and chemical properties of soil in two valleys, namely, Man Lunga valley (north east facing slopes) and Khamengar valley (south facing slopes) of Pin Valley National Park in Himachal Pradesh. The number of ground flora species in Man Lunga vailey and Khamengar valley were 38 and 30 respectively. On the basis of IVI, *Echinops cornigerus* DC. and *Ephedra gerardiana* Wall. ex Stapf. were the dominant species ia Man Lunga valley and Khamengar vailey respectively. In general, distribution of most of ground flora species was contiguous. Index of dominance was lower and index of diversity was higher for ground flora species in Man Lunga valley than Khamengarvaltey. Index of diversity was 4.584 and 4.052 in Mao Lunga valley and Khamengar valley respectively. Index of dissimilarity between two valleys was high which indicate remarkable degree of dissimilarity in ground flora species. The soil in Man Lunga valley (north east facing slopes) have better fertility status than Khamengar valley (south facing slopes).

316. **Verma, R.K., Subramani, S.P., Kapoor, K.S. & Kumar, S. 2005.** "Status of plant diversity around Renuka lake in Renuka Wildlife Sanctuary, Himachal Pradesh". *Environm. & Ecol.* 23(1): 158–163.

317. **Verma, R.K., Subramani, S.P., Kapoor, K.S. & Kumar, S. 2006.** "Plant diversity in alpine pasture of Shikari Devi Wildlife Sanctuary of district Mandi, Himachal Pradesh". *Environm. & Ecol.* 24(2): 243–248.

Abstract: Studies to evaluate the plant diversity and growth forms in alpine pasture of Shikari Devi wild life sanctuary falling in district Mandi, Himachal Pradesh, India, were carried out during August 2004. A total of 76 plant species, comprising 5 grasses, 2 sedges, 2 leguminous forbs and 67 non-leguminous forbs were recorded from the study area.

318. **Verma, R.K., Subramani, S.P., Kapoor, K.S. & Kumar, S. 2009.** "Plant species diversity along an altitudinal gradient in Simbalwara Wildlife Sanctuary, Himachal Pradesh". *Indian J. Forest.* 32(2): 195–209.

Abstract: The composition of forest vegetation along an altitudinal gradient (400 to 650 m) in Simbalwara Wildlife Sanctuary was studied during August, 2003. The forest is composed of 53 species of trees, 32 of shrubs and 175 of herbs. The plant communities identified at 400-525 m and 525-650 m elevation range were *Shorea robusta-Mallotus phillippensis* and *Shorea robusta-Terminalia alata* respectively. On the basis of important value index (IVI), *Shorea robusta* was the dominant tree species at both the elevation ranges. The distribution pattern of plant species was random and contiguous at both the altitudes. The concentration of dominance was lower and

index of diversity higher of plant species at both the altitudes. Index of diversity for trees was 4.390 and 3.942 at 400-525 m and 525-650 m elevation range respectively. The index of similarity for trees, shrubs and herbs between two altitudes was 0.64, 0.65 and 0.54 indicating remarkable degree of similarity in plant species. The population structure of tree species is represented mainly by two patterns, one represented by greater proportion of individuals in seedlings stage indicating frequent reproduction and another indicating more individuals in intermediate girth classes with absence of seedlings. If the latter trend continues for longer period, the species may disappear from the area in near future.

319. **Verma, R.K., Kapoor, K.S., Rawat, R.S., Subramani, S.P. & Kumar, S. 2005.** "Analysis of plant diversity in degraded and plantation forests in Kunihar Forest Division of Himachal Pradesh". *Indian J. Forest.* 28(1): 11–16.

Abstract: Plant species diversity of plantation forest and degraded forest in Surajpur block (Barotowala) of Kuthar Forest Range in Kunihar Forest Division of Himachal Pradesh was studied in October, 2000. The number of herbs and grasses species under plantation forest and degraded forest was 31 m^{-2} and 25 m^{-2}, respectively. On the basis of importance value index (IVI), *Justicia simplex* and *Andropogon* sp. were observed to be the dominant herbs under plantation forest and degraded forest, respectively. In general, distribution of most of the plant species was contiguous. Index of dominance was lower and index of diversity was higher for shrubs and herbs species under plantation forest than that of degraded forest. Index of diversity for herbs was 4.40 in plantation forest and 3.70 in degraded forest. The index of dissimilarity for herbs between plantation forest and degraded forest was high indicating remarkable degree of dissimilarity in herbs species. However, there was plenty of similarity between plantation forest and degraded forest as far as shrubs species under them was concerned. The soil under plantation forest has better fertility status in comparison to degraded forest.

320. **Verma, S. & Chauhan, N.S. 2008.** "Evaluation of *Bunium persicum* (Boiss.) Fedtsch (Kalazeera) germplasm in Himachal Pradesh". *J. Econ. Taxon. Bot.* 32(2): 342–349.

Abstract: The wealth of Medicinal and Aromatic plants in Himachal Pradesh constitutes an inspiring fund of variation, because of wide range of climatic and geographical conditions. From this colossal base of variability, desired genotypes/characters can be selected to improve efficiency and productivity of species and conserve the same for posterity as the total genetic diversity is being threatened by human notoriety. The objectives of present investigations were to evaluate different collections of *Bunium persicum* (Boiss.) Fedtsch for their growth and yield parameters. Survey of different areas of Kinnaur, Lahaul & Spiti and Chamba districts of Himachal Pradesh were done to collect kalazeera germplasm and allied species. Twenty collections of

Bunium persicum, which formed the base material for present investigations, were assessed for fourteen characters under this study. Maximum characters recorded statistically significant results which is an indication of existing high amount of variability between these collections. Same results have been revealed in the present paper.

321. **Vij, S.P. & Vaidya, Neera. 1993.** "Cytomorphological studies in *Cephalanthera longifolia* (L.) Fritsch.". *J. Orchid Soc. India* 7(1-2): 21–30.

Abstract: Cytomorphological details in Shimla hills of *Cephalanthera longifolia* have indicated their relationship through numerical and structural changes in chromosome complements. While some of these changes are reflected in the phenotype, others fail to do so. A relatively higher chiasma frequency in the female cells suggests their greater involvement in generating variability in the populations. Since these taxon exhibits a poor response to seed set, and a low incidence of vegetative reproduction, protection of its natural habitats and populations is suggested.

322. **Vij, S.P. & Vaidya, Neera. 1997.** "Cytological status of *Satyrium nepalense* populations in Shimla hills (N.W. Himalayas)". *J. Orchid Soc. India* 11(1-2): 5–11.

Abstract: Shimla hill populations of *Satyrium nepalense* D. Don exist at diploid (2n= 82), triploid (2n= 123) and tetraploid (2n= 164) levels on x= 41, with overlapping morphology. A population with 2n= 134, morphologically more like tetraploids, has been recorded for the first time. It seems to have evolved through reversal or ploidy and may have, infact, originated through selection of some of the variant cells as observed in the tetraploid populations. Origin of other cytotypes is also discussed.

323. **Vij, S.P., Toor, I.S. & Sekhar, N. 1982.** "Observations on the orchidaceous flora of Simla and adjacent hills in the N.W. Himalayas (Ecology and distribution)". *Res. Bull. Punjab Univ., Sci.* 33: 163–175.

324. **Vij, S.P., Verma, J. & Sathish Kumar, C. 2013.** *Orchids of Himachal Pradesh*. Bishen Singh Mahendra Pal Singh, Dehra Dun.

Abstract: *Orchids of Himachal Pradesh* describes in detail with colour pictures, drawings and paintings 84 species and 1 variety in 44 genera of orchids native to the Himalayan state of Himachal Pradesh (30°22' - 33°12' N latitudes and 75°47' and 79°04' E longitudes). Four subfamilies of the orchid family are represented here: 1. Cypripedioideae with one genus (*Cypripedium*) and two species; 2. Orchidoideae with 17 genera and 40 species; 3. Vanilloideae with one genus (*Galeola*) and a single species (*G. lindleyana* (Hook. f. & Thomson) Rchb. f.); and 4. Epidendroideae with 41 spp. and one variety in 25 genera. Easy to use identification keys to the subfamilies, genera and species are provided along with historical details, information on the type, etymology, ecology, phenology, occurrence within the state and distribution outside with notes wherever necessary. All the drawings prepared are original,

unpublished and made after specimens collected from the state for this purpose. This is the first time that the orchid flora of this state is studies in detail and published. The historical part of the book provides information on all the pioneers, mostly with pictures, who collected orchids in this state of the last two centuries. Etymology of the generic and specific names also supplies historical information, often with photos of the individuals after whom a species is named. Apart from detailed taxonomic descriptions of genera and species, cytological data and foliar features, freshly studied during this work are also added to make the book comprehensive. Nomenclature is made up to date in consultation with proper records.

325. **Watt, G. 1881.** "Notes on the vegetation of Chamba State and British Lahoul with descriptions of new species". *Bot. J. Linn. Soc.* 18: 368–382.

Fungi, Lichens, Algae, other non-flowering plant groups and Gymnosperms

326. **Ahmad, P.Z.I. & Sharma, S.D. 2007.** "Present status of *Taxus baccata* Linn. in Chopal Forest Division of Himachal Pradesh, India". *Ann. Forest.* 15(2): 306–310.

Abstract: The present study was conducted on *Taxus baccata*, commonly known as 'Himalayan Yew', belongs to the family Taxaceae. In recent years it has assumed great importance as it yields taxol, an anti-cancer agent used for the treatment of uterus and breast cancer. In view of its commercial importance it has been exploited on a large scale in the Western Himalayas by the industrialists, local inhabitants and nomadic Gujjars. Phytosociological analysis showed that among tree and shrubby vegetation, *Taxus baccata* and *Viburnum* species were the dominant species.

327. **Ahmad, Sultan. 1941.** "Gasteromycetes of the Western Himalayas-I". *J. Indian Bot. Soc.* 20: 173–182.

Abstract: Few Gasteromycetes viz., *Melanogaster ambiguous* (Vitt.) Tulasne from Chamba road, Dalhousie, *Rhizopogon rubescens* Tulasne and *Astraeus hygrometricus* (Pers.) Morgan from Dalhousie, *Tylostoma mussooriense* P. Henn. from Mussoorie, *Geaster simulans* Lloyd from Rotang Pass, *G. clelandii* Lloyd , *G. mammorus* Fr. from Jalori Pass, *G. triplex* Jungh. and *Mycenastrum corium* (Guers.) Desvaux from Kulu Hills, *G. saccatus* Fr. from Kanghan Valley, Hazara, *G. lilacinus* Mass. from Dehra Dun, *Bovista plumbea* Pers., *Calvetia gigantean* (Pers.) Lloyd and *Bovistella lycoperdioides* (Cke.) Lloyd from Sonamarg, *Bovistella bovistoides* (Cke. and Mass.) Lloyd from Kulu and *Calvetia caelata* (Bull.) Morgan from Babeh Pass, Bashahr Himalaya has been identified and reported in this paper from Western Himalayas.

328. **Ahmad, Sultan. 1942.** "Gasteromycetes of the Western Himalayas-II". *J. Indian Bot. Soc.* 21: 283–293.

329. **Ashok, D. & Prasher, I.B. 2014.** "Wood rooting non-gilled Agaricomycetes new to India". *J. New Biol. Rep.* 3(1): 4–8.

Abstract: Three species of non-gilled Agaricomyceteous fungi viz. *Fomitopsis lilacinogilva* (Berk.) J.E. Wright & J.R Deschamps, *Perenniporia fraxinophila* (Peck) Ryvarden and *Hyphodontia barbajovis* (Bull.) J. Erikss were collected from the Himachal Pradesh (North-Western Himalayas). They constitute a new record for India/Himalayas and are described and illustrated.

330. **Ashok, D. & Prasher, I.B. 2014.** "Some interesting wood rooting non-gilled Agaricomycetes: New to India". *J. New Biol. Rep.* 3(2): 155–158.

Abstract: Three species of non-gilled agaricomycetous fungi *Coronicium gemmiferum* (Bourdot & Galzin) J. Erikss., *Daedaleopsis septentrionalis* (P. Karst.) Niemelä, and *Acanthophysellum lividocoeruleum* (P. Karst.) Boidin were collected from the Himachal Pradesh. They constitute a new record for India and are described and illustrated.

331. **Aswal, B.S., Chandra, P. & Mehrotra, B.N. 1988.** "Contributions to the pteridophytic flora of Lahul valley (North West Himalayas)". *J. Econ. Taxon. Bot.* 12(2): 425–429.

Abstract: The present communication deals with the pteridophytic flora of Lahul valley in North West Himalayas. 23 species have been enumerated with brief ecological notes.

332. **Atri, N.S., Saini, S.S., Saini, M.K. & Gupta, A.K. 1993.** "Systematic studies on Russulaceous fungi– The genus *Lactarius* Pers.". *J. Indian Bot. Soc.* 72(1-2): 155–158.

Abstract: *Lactarius subvernalis* var. *himalayensis* var. nov., *L. sanmiguelensis* Hesler & Smith, *L. subisabellinus* var. *subisabellinus* Murrill and *L. piperatus* var. *glaucescens* (Crossl.) Hesler & Smith are illustrated and described from Himachal Pradesh. Out of these, the first taxon is new to science while the remaining three are new records for India.

333. **Awasthi, G. 1982.** "Lichen genus *Evernia* in India". *Bull. Bot. Surv. India* 24(1-4): 96–99.

Abstract: Three species of *Evernia* viz., *E. divaricata* (L.) Ach., *E. mesomorpha* Nyl. and *E. prunastri* (L.) Ach. known from India has been treated in detail. Three species of *Evernia* are known from India, where *E. divaricata* (L.) Ach., and *E. prunastri* (L.) Ach. appear to be restricted to the Himalayan region of Kashmir and *E. mesomorpha* Nyl. extends from W. Himalayas to E. Nepal. All the three taxa are widely distributed in the temperate regions of northern hemisphere, and particularly in Europe, and their occurrence in western Himalayas, thus represents examples of affinity of Indian lichen flora with that of European lichen flora.

334. **Baghla, A. & Khullar, S.P. 2004.** "The ferns of Solan district (Himachal Pradesh), W. Himalaya". *Indian Fern J.* 21: 119–125.

Abstract: A floristic survey of Solan district of Himachal Pradesh has been undertaken to identify the ferns of this area. Fifty four species belonging to genera *Adiantum* L., *Asplenium* L., *Ampelopteris* Kunze, *Araiostegia* Copeland, *Athyrium* Roth, *Cheilanthes* Swartz, *Christella* Leveille, *Crytomium* Presl., *Diplazium* Swartz, *Dryopteris* Adanson, *Glaphyropteridopsis* Ching, *Gymnopetis* Bernh., *Hypodematium* (Fossk.) Kunze, *Hypolepis* Bernh., *Lepisorus* (J. Sm.) Ching, *Onychium* Kaulfuss, *Ophioglossum* L., *Polypodiodes* Ching, *Polystichum* Roth, *Pteridium* Gleditsh ex Scopoli, *Pteris* L., *Proneprium* Presl., *Pyrrosia* Mirbel, *Sphenomeris* Maxon, *Woodwardia* J. Sm. have been collected.

335. **Barclay, A. 1891.** "Additional Uredineae from the neighborhood of Shimla (Western Himalaya)". *J. Asiat. Soc. Bengal* 60: 211–230.

336. **Bharat, N.K. 2006.** "Occurrence of powdery mildew on Seabuckthorn in Himachal Pradesh". *Indian Forester* 132 (4): 517.

Abstract: Seabuckthorn (*Hippophae* spp.) is an ecologically important shrub of dry temperate region of Himachal Pradesh. The lower leaf surface of Seabuckthorn was infected with a powdery mildew disease. After microscopic observations, it was identified that this fungal pathogen to be *Phyllactinia miracula*. The fungus was previously known to infect nursery plants of Seabuckthorn in Lahaul area of Lahaul and Spiti district, but the present study revealed that the fungus has also spread to the natural plantation of Seabuckthorn in dry temperate region of Himachal Pradesh.

337. **Bharat, N.K. 2008.** "Occurrence of rust on *Artemisia dracunculus* L. in Himachal Pradesh". *Indian Forester* 134(1): 140.

Abstract: The occurrence of rust on *Artemisia dracunculus* caused by the fungus *Puccinia tanaceti* var. *dracunculina* is the first report for India from Kinnaur distrct of Himachal Pradesh.

338. **Bhushan, B., Himanshu & Kumar, D. 2018.** "Cyanobacterial diversity of Una, H.P., India". *Indian J. Pl. Sci. 7*(1): 1–6.

Abstract: The Cyanobacteria are the most morphologically and developmentally diverse groups of prokaryotic organisms. They range from simple unicellular forms to complex filamentous organisms capable of true branching and the production of a variety of highly differentiated cell types. The present study was aimed to explore the distribution of cyanobacterial diversity of Una district, Himachal Pradesh. The cyanobacterial samples were collected from different seasons i.e., summer, rainy and winter. The genera include the species of *Microcystis* (4), *Chroococcus* (2), *Gloeocapsa* (2), *Aphanocapsa* (1), *Aphanothece* (1), *Synechococcus* (1), *Merismopedia* (1), *Dermocarpa* (1), *Spirulina* (1), *Oscillatoria* (5), *Phormidium* (1), *Lyngbya* (1) and *Nostoc* (1). The number put in the parentheses represents the number of the species of a particular genus. Some of the species have the capability to assimilate both carbon as well as nitrogen from the atmosphere.

339. **Bir, S.S. 1959.** "Cytotaxonomic observations on some Aspleniaceae from Kullu valley". *J. Indian Bot. Soc.* 38: 528–539.

Abstract: Chromosome numbers for eight members of the family Aspleniaceae (*sensu* Ching, 1940) from Kulu valley and one from Mussoorie, have been recorded. Out of these, for five species there is no previous data. All are cytologically normal and hybridity or apogamy is totally absent. Taxonomic confusion about *Asplenium Dalhousie* and *Diplazium polypodioides* have been cleared. A comparison with European and Ceylonese data on Pteridophytes has been made. *Athyrium proliferum* Moore is a new record for Western Himalayas. *Athyrium spectabile* should better be called a *Diplazium*.

340. **Bir, S.S. 1962.** "Cytotaxonomic observations on some ferns from Simla (W. Himalayas)". *Curr. Sci.* 31: 248–250.

341. **Bir, S.S. 1962.** "Some new and little known members of the genus *Athyrium* from the Himalayas". *Nova Hedwigia* 4: 165–170.

342. **Bir, S.S. 1963.** "Observations on the pteridophytic flora of Simla hills (North Western Himalayas)". *Bull. Bot. Surv. India* 5(2): 151–161.

Abstract: Ecological and distributional data about the Pteridophytic flora of Simla Hills in the North Western Himalayas is presented in this paper. Detailed observations on the habitat of various species have been made. In all, 121 species (9 fern-allies and 112 ferns) were collected, out of which, 22 are new records for the area. Amongst the interesting and rare ones are, *Cheilanthes chrysophylla* Hook., *Blechnum orientale* Linn., *Asplenium unilaterale* Lam. var. *udum* Atk., *Phymatodes erythrocarpa* (Mett. ex Kze.) Ching, *Pyrrosia flocullosa* (Don) Ching, *Anogramma leptophylla* (L.) Link, *Selaginella subdiaphana* (Wall.) Spr. and *S. sanguinolenta* (L.) Spr. forma *aitchisonii* (Hieron.) Alston. Simla combines the flora of the Eastern and North Western Himalayas and it may be treated as the western limit for *Blechnum orientale* Linn., *Sphenomis chinensis* Maxon, *Dennstaedtia scabra* (Wall.) Moore and *Asplenium unilaterale* Lam. Latest nomenclature has been used.

343. **Bir, S.S. 1964.** "Taxonomic notes on some Himalayas ferns". *J. Indian Bot. Soc.* 43: 556–572.

Abstract: Taxonomic account nof some Himalayan fern species 'complexes' is given. Four new varieties, namely, *Asplenium laciniatum* var. *acutipinna, A. planicaule* var. *obtusa, A. crinicaule* var. *sikkimense* and *A. nidus* var. *acutifolium* are described. New combinations proposed are: *Asplenium nidus* var. *phyllitidis* (Don) Bir, *Athyrium parasnathense* (Clarke) Ching, *Diplazium austral* (R. Br.) Bir and *D. bellum* (Clarke) Bir. It has been considered that for a satisfactory treatment of genus *Diplazium* Swatrtz several subgenera should be recognised within the boundaries of the genus. Two of these proposed subgenera are *Digrammaria* (Presl.) Bir and *Anisogonium* (Presl.) Bir.

The former subgenus represents those species in *Diplazium* in which 2-3 pairs of veinlets of adjacent groups fuse to form an excurrent veinlet towards the sinus and the rhizome structure shows the presence of medullary bundles in addition to an outer ring of meristeles. In the latter subgenus are segregated those species in which the veinlets fuse to form an areolae of irregular types. Nomenclature of a fern commonly called *Athyrium macrocarpum* (Bl.) Bedd. is also discussed.

344. **Bir, S.S. 1968.** "Pteridophytic flora of Simla hills (North Western Himalayas) 1: Introduction and general account". *Nova Hedwigia* 16: 439–447.

345. **Bir, S.S. & Bhusri, S. 1985.** "Pteridophytic flora of Simla Hills (North Western Himalayas)– Families: Equisetaceae, Selaginellaceae and Ophioglossaceae". *Indian Fern J.* 2: 39–56.

Abstract: Taxonomic account of the fern allies and eusporangiate ferns of the Simla region is given. In all, three species of *Equisetum*, six species of *Selaginella*, one of *Ophioglossum* and four species of *Botrychium* are described with key to the genera and species. Commonly named specimens of *S. chrysorrhizos* really belong to *S. chrysocaulos* and the so called *S. chrysocaulos* of the western Himalayas is *S. subdiaphana*. Low level of *S. pallida* is also described. It resembles *S. pallidissima* in habit but possesses tetragonous cones. True *S. chrysorrhizos* is not represented in the north western Himalayan region.

346. **Bir, S.S. & Satija, C.K. 1981.** "*Lepisorus kashyapii* in the Western Himalayas". *American Fern J.* 71(2): 53–56.

347. **Bir, S.S. & Shukla, P. 1966.** "Pteridophytic flora of Simla hills (North Western Himalayas). Families: Athyriaceae". *Bull. Bot. Surv. India* 8(3-4): 264–277.

Abstract: The paper deals with the taxonomic account of family Athyriaceae from Simla hills. Twenty one species are described and illustrated. The members of *Athyrium nigripes* group (*A. nigripes*, *A. clarkei* and *A. setiferum*) are characterised by the presence of setae on upper surface along costae and costules and possess non-perisporiate spores. The western Himalayan samples of *Cystopteris fragilis* possess rugoseverrucose spores in strong contrast to the spiny spores in several European examples. *Athyrium mackinnoni* is very distinct from *A. nigripes* under which its specimens have often been described. The Simla samples of *Athyrium fimbriatum*, in comparison to those from Darjeeling-Sikkim area, are of much smaller size and less divided. *Diplazium polypodioides* of the area is a polymorphic species and the different forms can hardly be taxonomically separated.

348. **Bir, S.S. & Shukla, P. 1968.** "Pteridophytic flora of Simla hills (north western Himalayas)– Families: Aspleniaceae and Blechnaceae". *Nova Hedwigia* 16: 469–482.

349. **Bir, S.S. & Shukla, P. 1971.** "Pteridophytic flora of Simla hills (N.W. Himalayas). Families: Loxogrammaceae and Polypodiaceae". *Nova Hedwigia* 21: 193–224.

350. **Bir, S.S., Rani, S. & Verma, S.C. 1986.** "Pteridophytic flora of Simla hills (North Western Himalayas)– Families: Osmundaceae, Adiantaceae and Cryptogrammaceae". *Indian Fern J.* 3: 22–37.

Abstract: Descriptive account of 12 species belonging to *Osmunda* (2 species), *Adiantum* (6 species), *Onychium* (3 species) and *Cryptogramma* (1 species) have been given and illustrated with key to families, genera and species for their easy identification in the field. Amongst these, *Osmunda regalis, O. Claytoniana* and *Cryptogramma crispa* have very restricted but locally fairly common.

351. **Blanford, H.F. 1886.** "The Silver ferns of Simla and their allies". *J. Simla Nat. Soc.* 2: 13–32.

352. **Blanford, H.F. 1888.** "A list of ferns of Simla in the N.W. Himalaya between levels 4600 and 10500 ft.". *J. Asiat. Soc. Bengal* 57: 294–315.

353. **Chandel, S. 2016.** "Diversity status of Arbuscular Mycorrhizal (AM) fungi from rhizospheric soils of medicinal and aromatic plants in Himachal Pradesh". *Indian Forester* 142(7): 690–696.

Abstract: Arbuscular mycorrhizal (AM) fungi are known to improve plant growth, nutrition uptake and defense mechanisms in plants. AM fungi have been observed to be associated with many plants including medicinal and aromatic plants. In the present study an attempt was made to study the diversity status of the AM fungi associated with medicinal and aromatic plants, Himachal Pradesh, India. It was noticed that the AM fungal spores were invariably present in the rhizospheres of all plants screened except *Cichorium intybus, Saussurea lappa, Gentiana kurroo, Spilanthus acemella* and *Withania somnifera*. Maximum number of AM fungal spores was recorded from soil samples collected from Solan district followed by Sirmour, Kinnaur and Mandi districts. Among different soil samples analysed, Solanum laciniatum harbours maximum AM fungal spores followed by *Alpinia calcarata, Roscoea alpinia* in Solan. A total of four different genera of AM fungi viz., *Acaulospora, Glomus, Entrophospora* and *Scutellospora* were isolated and identified. Among them, the genus *Glomus* was found dominant with maximum frequency percentage occurrence (80%) when compared to other genera.

354. **Chandel, S., Chauhan, P. & Kumar, V. 2018.** "A new host record of powdery mildew on *Bauhinia purpurea* from Himachal Pradesh, India". *Indian Forester* 145(11): 1119.

355. **Chander, Hem & Pathania, Jyoti. 2018.** "Notes on occurrence of anti HIV-1 medicinal macrofungi *Tyromyces chioneus* in Hamirpur district, Himachal Pradesh". *CPUH Res. J.* 3(2): 187–190.

Abstract: *Tyromyces chioneus* (Fr.) P. Karst has a circumpolar distribution, in temperate boreal pine forests, including Asia, Europe, and North America. It is being reported for the first time from district Hamirpur of Himachal Pradesh. This basidiomycete macrofungi is commonly known as white cheese polypore. It is a wood rotting fungi and causes white rot of dead pine trees in Hamirpur district. It contains a novel cadinane sesquiterpene named 4â,14-dihydroxy-6a,7â H-1(10)-cadinene. This molecule has significant anti HIV-1 activity.

356. **Chander, Hem, Choudhary, Neha & Sharma, Priyanka. 2017.** "Taxonomic and ethnobotanical notes on some ferns and fern allies of Hamirpur (H.P.), North-Western Himalaya". *J. Biol. Chem. Chron.* 3(1): 28–40.

Abstract: Keeping in view the ecological and ethnobotanical importance and in contrast to the insufficient data available on the geographical distribution, floristics and diversity of pteridophytes in Hamirpur (H.P.), the floristic investigations were initiated to describe and preserve ferns and fern allies of this Himalayan region. The present investigations have revealed the occurrence of twelve species of ferns and fern allies viz., *Adiantum capillus-veneris* L., *Adiantum incisum* Forssk., *Asplenium dalhousiae* Hook., *Athyrium attenuatum* (Wall. ex Clarke) Tagawa, *Cheilanthes bicolor* (Roxb.) Fraser-Jenkins, *Equisetum ramosissimum* Desf., *Onychium contiguum* Wall. ex Hope, *Onychium plumosum* Ching, *Pteris cretica* L., *Pteris vittata* L., *Selaginella chrysocaulos* (Hook. & Grev.) Spring and *Thelypteris dentata* (Forssk.) John. All these taxa are of ethnobotanical importance.

357. **Chander, Hem, Sapna, Deepika & Sanjna. 2019.** "Species diversity of lichens in Balh valley of Himachal Pradesh, North Western Himalaya". *J. Biol. Chem. Chron.* 5(2): 32–40.

Abstract: During present investigation a total of sixty specimens of lichens were collected from Balh valley. The lichens were collected during November 2018 to February 2019 from twenty eight localities of Balh Valley in Mandi district of Himachal Pradesh, North Western Himalaya. A total of nineteen species of lichens were identified on the basis of morphological and anatomical characters. Relevant literature was consulted for confirmation of species identification. Out of the identified species, one species viz. *Usnea longissima* is being reported for the first time from Mandi district. *Phaeophyscia hispidula* is most common out of the nineteen species and is found in fifteen localities. The species diversity index (á, â, d) of all the localities was calculated. The highest alpha diversity (four) was found in Bagla and Kasarla. The lowest alpha diversity (one) was found at Bhour, Chakker, Kansa, Nagchala and Pairi. Beta diversity of all localities was 47 and gamma diversity was 19. The identified specimens have been deposited in CPUH (The Herbarium, Department of Biosciences, Career Point University Hamirpur) for preservation and future reference.

358. **Chandra, Anup. 2014.** "Infestation of *Viscum album* Linn. on *Robinia pseuo-acacia* Linn.". *Indian J. Forest.* 37(3): 289–290.

Abstract: A survey was carried out in the Rohru district, Himachal Pradesh. It was observed that *Robinia pseudo-acacia* was infested with mistletoes. It was identified as *Viscum album*. Infestation was observed almost all the trees. Hence, suitable management practices should be undertaken to check the spread of *V. album*.

359. **Clarke, C.B. 1880.** "A review of the ferns of Northern India". *Trans. Linn. Soc. London, Bot. Ser. 2.* 1: 425–619.

360. **Dargan, J.S. & Bhatia, Madhu. 1986.** "A new variety of *Hypomyces auratius* (Pers.: Fr.) Tul. from India". *J. Indian Bot. Soc.* 65(1-4): 53–55.

Abstract: *Hypomyces auratius* (Pers.: Fr.) Tul. var. *microspora* var. nov. is proposed, based on the collection from the Western Himalayas (Uttar Pradesh and Himachal Pradesh). The species aws also not known previously from India.

361. **Das, Kanad & Sharma, J.R. 2004.** "Russulacean macrofungi in North-Western Hiamalaya". *Phytotaxonomy* 4: 1–10.

Abstract: A total of 149 taxa (135 species and 14 varieties) belonging to the family Russulaceae have been recorded from various vegetational zones of North-western Himalaya. About 76% of them preferably share deciduous and coniferous forests equally and only 4% grow in both. Nearly 15% grow in mixed forests, 2% in all types of forests and 3% in grassy grounds. Temperate forests are most productive and support about 77% of taxa, while only 4% grow up to tree line and beyond, in alpine meadows/morains. Oaks are the best hosts supporting about 60% of taxa followed by *Cedrus* (34%) and *Pinus* (26%). Type of threats and conservation of these fungi are also discussed.

362. **Dhingra, G.S. & Singla, N. 1993.** "Studies in North-West Himalayan Corticeaceae (Basidiomycetes)- I– Some interesting species from Dalhousie Hill". *J. Indian Bot. Soc.* 72: 29–33.

Abstract: An account of 8 species of family Corticiaceae based on the collections from the Dalhousie hills made during the years 1988-1989 has been given in this paper. Of these, *Hyphoderma setigerum* var. *bicytidium* Dhingra & Nishi var. nov. is proposed as a new variety, *Trechispora microspora* (Karst.) Liberta and *Fibulomyces mutabilis* (Bres.) Jiilich are new records for India, while *Hyphoderma tsugae* (Burt.) Erikss. & Strid and *Hyphodontia propinqua* Hjortst. are new records for North-West Himalayas. An illustrated and detailed account has been given for the new variety and new records for India, for rest of the taxa only brief taxonomic notes are given.

363. **Dhingra, G.S. & Rani, M. 1994.** "North-West Himalayan Thelephoraceae (Basidiomycetes) Genus *Tomentella* from Dalhousie Hills". *Curr. Res. Pl. Sci.* 1994: 43–56.

364. **Dhingra, G.S. & Singla, N. 1997.** "North-West Himalayan Corticiaceae– Three rare species from Dalhousie Hills". *Geobios New Rep.* 16: 70–72.

365. **Dhingra, G.S. & Singh, A.P. 2008.** "A new species of Ceraceomyces (Basidiomycetes) from India". *Mycotaxon* 106: 399–401.

Abstract: A new corticioid species, *Ceraceomyces bizonatus*, is described from Manali hills in Himachal Pradesh. While exploring the deodar forest in the Kothi area of Manali hills in district Kullu of Himachal Pradesh, India, the authors made a collection on a decaying log of *Cedrus deodara* with ceraceous hymenial surface. After detailed macroscopic and microscopic comparisons with descriptions of known species of genus Ceraceomyces (Jülich 1972, Eriksson & Ryvarden 1973, Rattan 1977, Thind & Dhingra 1985, Hjortstam 1998, Larsson & Larsson 1998) we found it to belong to this genus but representing a species of its own. Typical characters for the genus are the ceraceous basidiocarps, clavate, 4-spored basidia with a basal clamp and ellipsoid to somewhat subglobose basidiospores. On the basis of absence of cystidia, it comes closest to *C. microsporus*. However, a two-zoned subhymenium, with a lower zone of vertical hyphae and an upper peculiar zone of short-celled almost isodiametric encrusted hyphae, suggests that it represents a new species.

366. **Dhingra, G.S. & Singh, A.P. 2009.** "Diversity of Resupinate Aphyllophoraceous Fungi Himachal Pradesh: Family Coniophoraceae". *J. Indian Bot. Soc.* 88(1&2) 122–127.

Abstract: An account of 7 species spread over 3 genera belonging to family Coniophoraceae (Boletales, Basidiomycetes) has been given. Of these, *Coniophorella* is a new generic record for India; and *Coniophorella olivacea, Coniophora fusispora* and *C. viridis* are new specific records for India. *Coniophora olivascens, C. cordensis* and *C. puteana* on *Cedrus deodara* and *Serpula himantoides* on *Pinus roxburghii* are being reported as new host records.

367. **Dhingra, G.S., Singh, A.P. & Singla, N. 2009.** "A new species of *Hyphoderma* (Basidiomycetes) from India". *Mycotaxon* 108: 197–199.

Abstract: A new corticioid species, *Hyphoderma singularibasidium*, is described from Dalhausie hills in Himachal Pradesh. During the fungal forays conducted in the Banikhet area of Dalhausie hills in district Chamba of Himachal Pradesh, India, Dhingra & Singla made a collection on the underside of a decayed gymnospermous log. After detailed macroscopic and microscopic comparisons with descriptions of known species of genus *Hyphoderma* (Eriksson & Ryvarden 1975, Rattan 1977, Dhingra 1989) we found it to belong to this genus but representing a species of its own. Typical characters of the genus are large sized, clavate, somewhat constricted, 4-spored basidia and ellipsoid basidiospores with oily contents. However, wide-and short-celled subhymenial hyphae,

basidia with a peculiar outgrowth arising from the middle of the basidium, and broadly ellipsoid basidiospores suggest that the collection represents a new species.

368. **Dhingra, G.S., Priyanka & Singh, A.P. 2009.** "Three new records of genus *Sistotrema* from India". *J. Indian Bot. Soc.* 88: 76–79.

Abstract: A detailed illustrated acoount of three species of *Sistotrema* (*S. subtrigonospermum, S. brinkmannii* and *S. sernanderi*) belonging to the family Sistotremataceae, based on collections made from Himachal Pradesh during the monsoon of 2004-2007 is given. All the species are new records for India.

369. **Dhir, K.K. 1980.** "Ferns of North-Western Himalayas". *Biblioth. Pteridologica* 1: 1–138.

Abstract: The present paper deals with the floristic and ecological observations on ferns of north-western Himalayas. The available information on nomenclatural changes has been incorporated in this account. A brief data about climate, soils and vegetation of the area are also presented.

370. **Dhir, K.K. & Datta, K.S. 1976a.** "Ferns of Dharamsala Hills-2 (North-Western Himalayas). Families Woodsiaceae, Aspidiaceae and Athyriaceae". *Nova Hedwigia* 27: 393–424.

371. **Dhir, K.K. & Datta, K.S. 1976b.** "Ferns of Dharamsala Hills-3 (North-Western Himalayas). Families Thelypteridaceae, Aspleniaceae and Blechnaceae". *Nova Hedwigia* 28: 137–154.

372. **Dhir, K.K. & Datta, K.S. 1977.** "Ferns of Dharamsala Hills-1 (North-Western Himalayas). Ophioglossaceous, Schizaceous anf Hymenophyllaceous series". *J. Bombay Nat. Hist. Soc.* 74: 459–480.

Abstract: This study deals with 21 species of ferns of Dharamsala hills. All important morphological characters on which the classification is based namely type of rhizome, dermal appendages on rhizome, stipe, rachis, rachilets or costules (when present), almina, venation, sporal position, industrial architecture (if present) and sporangial organisation are described and illustrated. Keys to the genera and species have been prepared.

373. **Dhir, K.K. & Datta, K.S. 1979.** "Ferns of Dharamsala- 4 (North-Western Himalayas). Families Polypodiaceae". *Nova Hedwigia* 29: 105–120.

374. **Dhir, K.K. & Sheera, P.S. 1975.** "Ecological and phytogeographical observations on the pteridophytes of Dharamsala hills (North-Western Himalayas". *Nova Hedwigia* 26: 353–371.

375. **Dwivedi, Himanshu, Kumar, Brijesh, Joshi, Pushpesh & Pande, H.C. 2013.** "*Athyrium drepanopterum* (Kunze) A. Braun ex Milde– An addition to the state fern flora of Himachal Pradesh". *Indian J. Forest.* 36(3): 375–378.

Abstract: The fern *Athyrium drepanopterum* (Kunze) A. Braun ex Milde is a new record for the state of Himachal Pradesh, India.

376. **Dwivedi, Himanshu, Joshi, Pushpesh, Kumar, Brijesh, Srivastava, S.K. & Durgapal, A. 2015.** "New locality record of two Athyroid ferns from Himachal Pradesh (Western Himalaya)". *Phytotaxonomy* 15: 133–137.

Abstract: *Athyrium davidii* (Franch.) Christ and *A. falcatum* Bedd. are reported for the first time from Himachal Pradesh. Detailed descriptions along with illustrated colour plates are provided here.

377. **Dwivedi, Rakesh Kumar & Misra, Pradeep Kumar. 2012.** "On diversity on members of Surirellaceae (Diatoms) from southern Himachal Pradesh, with some new records in India". *Phytotaxonomy* 12: 100–104.

Abstract: The present paper deals with the 9 freshwater diatom taxa from the southern Himachal Pradesh, situated in the Indo-Western Himalaya. These taxa have been collected from Solan, Sirmaur, Mandi, Una, Bilaspur and Hamirpur districts of the state of Himachal Pradesh. Out of the nine, two taxa are new records for the diatom flora of India. All these collections have been done from the lotic water bodies of the southern Himachal Pradesh.

378. **Dwivedi, Rakesh Kumar & Misra, Pradeep Kumar. 2014.** "On some freshwater algae of district Una, Himachal Pradesh, India". *Phytotaxonomy* 14: 103–106.

Abstract: A total of freshwater algae have been described in the present paper. These are *Chaetophora* Schrank (2 spp.), *Stigeoclonium* Kuetzing (1 sp., 1 var.), *Coleochaete* Brebisson (1 sp.), *Spirogyra* Link (8 spp.), *Zygnema* Agardh (1 sp.) and *Closterium* Nitzsch (3 spp, 1 var.). All these algae are the numbers of Class Chlorophyceae of Division Chlorophyta. These are being reported for the first time from Una district of Himachal Pradesh.

379. **Dwivedi, Rakesh Kumar & Misra, Pradeep Kumar. 2015.** "Freshwater diatoms from Himalayan state Himachal Pradesh, India". *Phykos* 45(1): 30–39.

Abstract: Thirty one taxa of freshwater diatoms have been reported from the districts Mandi, Una, Hamirpur, Solan, Shimla and Bilaspur of the state Himachal Pradesh. These taxa belong to genera *Cymbella* Agardh (4 spp., 1 var.), *Encyonema* Kützing (1 sp.), *Gomphonema* Ehrenberg (9 spp., 7 var., 2 forma), *Didymosphenia* M. Schmidt (1 sp.), *Pleurosigma* (Smith) Cleve (1 sp.), *Gyrosigma* Hassall (2 spp.), and *Navicula* Bory (2 spp.). Out of these, *Encyonema subalpinum* (Hustedt) D.G. Mann and *Gomphonema towutense* Hustedt are the new records to the diatom flora of India.

380. **Dwivedi, Rakesh Kumar, Misra, Pradeep Kumar, Shukla, C.P. & Tripathi, Santosh Kumar. 2008.** "On some desmids from southern Himachal Pradesh of Western Himalaya and its foothills, India". *Phytotaxonomy* 8: 83–86.

Abstract: Twelve taxa of desmids belonging to the class Chlorophyceae (order- Conjugales, family- Desmidiaceae) collected from different aquatic habitats of Una, Mandi and Hamirpur districts of Himachal Pradesh have been described. These areas fall in Western Himalayan region of India. These taxa belong to 2 genera, viz. *Euastrum* Ehrenb. (2 spp., 2 varieties) and *Staurastrum* Meyen (6 spp., 1 variety and 1 forma). Of these, 11 taxa are new records from Himachal Pradesh.

381. **Dwivedi, Rakesh Kumar, Shukla, S.K., Shukla, C.P., Misra, Pradeep Kumar & Seth, M.K. 2008.** "Cyanophycean flora of southern Himanchal Pradesh". *Ecoprint* 15: 29–36.

Abstract: The present paper deals with 37 taxa, 18 genera, 32 species, 4 varieties and 1 forma explored from southern Himanchal Pradesh of India. These taxa are represented by *Microcystis, Chroococcus, Aphanocapsa, Aphanothece, Merismopedia, Coelosphaerium, Gomphosphaeria, Stichosiphon, Oscillatoria, Lyngbya, Pseudanabaena, Cylindrospermum, Anabaena, Nostoc, Nodularia, Fortiea, Calothrix* and *Anabaenopsis*. Out of 37 taxa, 27 are first report from the study area.

382. **Dwivedi, Rakesh Kumar, Shukla, C.P., Misra, Pradeep Kumar, Shukla, S.K. & Seth, M.K. 2009.** "On desmids of Southern Himachal Pradesh of Indo-western Himalaya". *Feddes Repert.* 120(3-4): 236–249.

Abstract: Thirty nine taxa of Class Chlorophyceae (Order Zygnematales, Family Desmidiaceae) collected from different aquatic habitats of Sirmaur, Solan, Shimla, Una, Hamirpur, Bilaspur and Mandi districts of Himachal Pradesh, India have been described. These taxa belong to six genera viz. *Closterium* Nitzsch (three species, two varieties), *Pleurotaenium* Ngeli (two spp.), *Cosmarium* Corda ex Ralfs (18 spp., ten var.), *Micrasterias* C. Agardh (one sp.), *Spondylosium* Bréb. (one sp.) and *Euastrum* Ehrenb. (one sp., one var.). 38 taxa are being reported for the first time from the state of Himachal Pradesh out of which 28 taxa are of *Cosmarium* indicating that water bodies of Southern Himachal Pradesh are clean (oligotrophic) and need to protect. Overall presence of desmids reveals the oligotrophic nature of water bodies.

383. **Gautam, Ajay Kumar. 2013.** "Natural occurrence of *Alternaria alternata* on *Agave americana*: A report from Himachal Pradesh, India". *J. New Biol. Rep.* 2(1): 36–39.

Abstract: Disease symptoms as round and golden brown spots to coloured longitudinal streaks were observed during two consecutive seasons (2011-2012) on leaves of *Agave americana*. About 90-95% of plants were found affected with disease. On the basis of disease symptoms, morphological characters and dimensions of conidia, the pathogen was identified as *Alternaria alternata* (Fr.) Keissler.

384. **Gautam, Ajay Kumar. 2014.** "Diversity of fungal endophytes in some medicinal plants from Himachal Pradesh, India". *Arch. Phytopathol. Pl. Prot.* 47(5): 537–544.

Abstract: Fungal endophytes were isolated from surface sterilised leaf segments of five medicinal plants collected from Mandi district, Himachal Pradesh, India. A total of 373 fungal strains belonging to 15 fungal genera and 18 species, *Aspergillus niger, A. flavus, A. clavatus, A. variecolor, Penicillium chrsogenum, Alternaria alternata, Curvularia lunata, Haplosporium* sp., *Phoma* sp., *Nigrospora* sp., *Colletotrichum* sp., *Cladosporium* sp., *Stemphylium* sp., *Fusarium* sp., *Geo-trichum* sp., *Phomopsis* sp., *Trichoderma* sp., *Rhizopus* sp. and some sterile mycelium were isolated from all the plants. The relative frequency, isolation rate and colonisation rates of endophytes were used to study the endophytic diversity. The results showed that the highest colonisation rate (93.05%) was observed in *Adhatoda vasica*, while it was 91.66% in *Ocimum sanctum*, 85% in *Viola odorata*, 82.81% *Cannabis sativa* and lowest (61.11%) in *Withania somnifera*. Moreover, reading the richness and diversity of the endophytic fungi, the highest was obtained for *O. sanctum, W. somnifera and C. sativa* having eight species each, while lowest (6 and 4) was obtained from *A. vasica* and *V. odorata*, respectively. As the role of endophytic organisms in defensive mechanisms of plants is now well established, the present study is an important step to find new and interesting endophytes among the medicinal plants.

385. **Gautam, Ajay Kumar. 2014.** "Powdery mildew of *Celtis australis* L.: A report from Himachal Pradesh, India". *Pl. Pathol. & Quarantine* 4(1): 14–16.

Abstract: A detailed study of a powdery mildew observed on *Celtis australis* leaves was carried out in the present study. The symptoms appeared as white mycelia on leaves with embedded small black to brown spherical ascomata. Morphological and microscopic analyses of diseased samples revealed that this fungus belongs to *Erysiphe* section Uncinula. Further investigation identified it as *Erysiphe kusanoi* which is new to Himachal Pradesh. A description and an illustration of the specimen are given.

386. **Gautam, Ajay Kumar. 2014.** "Occurrence of black mildew on *Aegle marmelos* at Himachal Pradesh, India". *Int. J. Phytopathol.* 3(3): 161–162.

Abstract: The leaves of *Aegle marmelos* were found infected with black mildew during a routine mycological survey at district Bilaspur, a south west region of Himachal Pradesh. Fungal colonies form infected leaves were analysed for morphological and microscopic studies. Nail polish technique was used to study the colonies *in situ*. Presence of unicellular appressoria with sarciniform and *Questieriella* conidial anamorphic states identified it as the fungus belongs to genus *Schiffnerula*. Further investigation identified it as *Schiffnerula girijae* Hosag. & Archana. The fungus is reported previously form Thiruvananthapuram, Kerala, India on the same host (*A. marmelos*) but no reports from other parts of the country. Therefore, this is the second report of black mildew on *Aegle marmelos* form India while first from north India.

387. **Gautam, Ajay Kumar. 2014.** "A study on mango (*Mangifera indica* L.) trunk decay by *Phellinus gilvus* (Schw.) Pat. from Himachal Pradesh, India". *Int. Lett. Nat. Sci.* 11: 9–15.

Abstract: A severe white rot decay of a very old mango (*Mangifera indica* L.) tree trunk was observed form Himachal Pradesh, a hilly state of north India. The initial of decaying symptoms were firstly noticed in 2010 which progressed with destructive tissue death of tree trunk. A spongy, sessile, bracket-fungus was found associated with the decay. Morphological and microscopic examination of the collected specimens confirmed the fungus as *Phellinus gilvus* (Schw.) Pat. Since, *P. gilvus* is a saprobic fungus having a wide host range worldwide and *M. indica* is one of the most attacked hosts in India. Therefore, the present report is an important addition to the existing knowledge which will be helpful in understanding the pathogen diversity and interaction with host.

388. **Gautam, Ajay Kumar. 2014.** "*Fusicladium ahmadii* on *Pyrus pashia*: A new record for Indian mycobiota from Himcahal Pradesh". *Pl. Pathol. & Quarantine* 4(2): 86–89.

Abstract: *Fusicladium ahmadii* on *Pyrus pashia* collected from Himachal Pradesh, India is illustrated and described in the present paper with special notes on its morphology and taxonomy. The description of fungus is given along with images of conidiogenous cells and conidia. As per literature consulted, this is the first report of *Fusicladium ahmadii* from India and probably second from world.

389. **Gautam, Ajay Kumar. 2015.** "*Prillieuxina aeglicola* sp. nov. (Ascomycota), a new black mildew fungus from Himachal Pradesh, India". *Curr. Res. Environm. & Appl. Mycol.* 5(1): 70–73.

Abstract: A black mildew infection was observed on leaves of *Aegle marmelos* from Himachal Pradesh, India. The fungus as a species of *Prillieuxina* was characterized by substraight, branched hyphae without appressoria and setae; orbicular thyriothecia and brown uniseptate ascospores. *Prillieuxina* and its species are host specific fungi and no earlier reports on *A. marmelos*. Therefore new species is described and illustrated in the present paper based on morphology and specificity of host association.

390. **Gautam, Ajay Kumar. 2015.** "First report of *Nigrospora sphaerica* causing leaf spots on *Celtis australis* from Himachal Pradesh. India". *Int. Lett. Nat. Sci.* 40: 18–20.

Abstract: *Nigrospora sphaerica* collected on living leaves of *Celtis australis* L. (Cannabaceae) from Himachal Pradesh, India is a new host record. Symptoms of the disease on leaves appeared in the form of small, circular to irregular, brown - coloured spots surrounded by a yellow zone. The fungus isolated was identified as *Nigrospora sphaerica* (Sacc.) E.W. Mason, on the basis of cultural and morphological characters. The fungus is described and illustrated.

391. **Gautam, Ajay Kumar & Avasthi, S. 2016.** "Some new additions to black mildew fungi of North Western Himalayas, India". *Curr. Res. Environm. & Appl. Mycol.* 6(2): 111–117.

Abstract: Three black mildew fungi, namely *Schiffnerula celastri, Sarcinella oreophila* and *Schiffnerula cryptostegiae* were reported on *Celastrus paniculatus, Carissa* sp. and *Cryptolepis buchanani* respectively and are described and illustrated in detail in the present study. Although, these black mildews have previously been reported from various parts of India, there is no report from Himachal Pradesh and surrounding areas. Therefore, the present study contributes new records to the black mildew fungi, not only in the state, but also in the north western Himalaya.

392. **Gautam, Ajay Kumar & Avasthi, S. 2016.** "*Prillieuxina citricola* sp. nov. from Himachal Pradesh, India". *Curr. Res. Environm. & Appl. Mycol.* 6(4): 288–292.

Abstract: The present paper deals with a new black mildew collected on living leaves of lemon (*Citrus aurantifolia*, Rutaceae), from Bilaspur, Himachal Pradesh, India. The fungus was identified as the species of *Prillieuxina* as it contains substraight, branched hyphae without appressoria and setae; orbicular thyriothecia and brown uniseptate ascospores. A critical comparison of current taxon was carried out with species of genus *Prillieuxina* reported earlier on plants of the family Rutaceae and other closely similar species and found that there are no earlier reports on *Citrus aurantifolia*. Therefore, new species *Prillieuxina citricola* is described and illustrated in the present paper based on morphology and specificity of host association.

393. **Gautam, Ajay Kumar & Avasthi, S. 2016.** "*Camptomeris albiziae* on *Albizia lebbeck*: first record for North Western Himalayas and its distribution extension in India". *Curr. Res. Environm. & Appl. Mycol.* 6(4): 300–304.

Abstract: *Camptomeris albiziae* (Petch) E.W. Mason collected from leaves of *Albizia lebbek* (Linn.) Willd., from Bilaspur, Himachal Pradesh, India, is described and illustrated. A literature survey revealed that this fungus has not been so far reported from North Western Himalaya and thus represents an extension of distribution of the fungus in India. Details on symptoms on host plant leaves, taxonomic descriptions and illustrations are provided here.

394. **Gautam, Ajay Kumar & Avasthi, S. 2016.** "*Ampelomyces quisqualis* Ces.– A mycoparasite of *Euphorbia hirta* powdery mildew in Himachal Pradesh, India". *J. Phytopathol. Pest Manage.* 3(2): 64–70.

Abstract: Mycoparasitism is defined as the association of two fungi where one acts as parasite over the other. In October 2015, a powdery mildew infection was observed on *Euphorbia hirta* during the routine mycological survey in district Mandi the central region of Himachal Pradesh, India. During the course of microscopic examinations

infection was found mixed with another unknown fungus. Upon morphological and microscopic examinations of infection on leaves, *Podosphaera euphorbiae-hirtae* was identified as powdery mildew fungus mixed with a mycoparasite *Ampelomyces quisqualis*. To the best of our knowledge, this is the first report of mycoparasitism of *Ampelomyces quisqualis* on powdery mildew of *Euphorbia hirta* in India.

395. **Gautam, Ajay Kumar & Avasthi, S. 2016.** "*Ampelomyces quisqualis*– A remarkable mycoparasite on *Xanthium strumarium* powdery mildew from Himachal Pradesh India". *J. New Biol. Rep*. *5*(1): 1–6.

Abstract: A powdery mildew infection was observed on *Xanthium strumarium* during the routine mycological survey in district Mandi of Himachal Pradesh, India. Morphological and microscopic examinations revealed the identity of powdery mildew as *Podosphaera xanthii*. The white powdery mildew infection was found mixed with brownish intercellular pycnidia during mycological examinations. These brown coloured pycnidia were picked up with the help of a needle under dissecting microspore and mounted in lactophenol cotton blue stain. Critical examinations identify it as a mycoparasite namely *Ampelomyces quisqualis*. To best of our knowledge, this is the first report of mycoparasite *A. quisqualis* on *X. strumarium* in India.

396. **Gautam, Ajay Kumar & Avasthi, S. 2016.** "First checklist of rust fungi in the genus *Puccinia* from Himachal Pradesh, India". *Pl. Pathol. & Quarantine* 6: 106–120.

Abstract: A checklist of rust fungi belonging to the genus *Puccinia* was prepared for Himachal Pradesh, India. All *Puccinia* species published until 2014 are included in this list. A total of 80 species have been reported on 91 plant species belonging to 33 families. The family Poaceae supports the highest number of species (26 species) followed by Ranunculaceae (8), Asteraceae (7), Apiaceae and Polygonaceae (6 each), Rubiaceae and Cyperaceae (3 each), Acanthaceae, Berberidaceae, Lamiaceae and Saxifragaceae (2 each). The other host plant families are associated with a single species of *Puccinia*. This study provides the first checklist of *Puccinia* from Himachal Pradesh.

397. **Gautam, Ajay Kumar & Avasthi, S. 2016.** "*Puccinia himachalensis* – A new rust fungus from Himachal Pradesh, India". *Pl. Pathol. & Quarantine* 6: 220–223.

Abstract: A new species of rust, *Puccinia himachalensis*, was recorded on *Clematis grata* from Himachal Pradesh, India. The species is compared morphologically with other *Puccinia* species described on the same plant host. A close resemblance was observed with *P. wattiana* but it differed in morphological characteristics including spore size and septal colouration in teliospores. Therefore, it is justified to introduce a new species of *Puccinia*. The taxonomic details of the new taxon, including field photographs and microphotographs, are presented and its distinctive characters are discussed.

398. **Gautam, Ajay Kumar & Avasthi, S. 2016.** "*Ampelomyces quisqualis*– A remarkable mycoparasite on *Xanthium strumarium* powdery mildew from Himachal Pradesh, India". *J. New Biol. Rep.* 5(1): 1–6.

Abstract: A powdery mildew infection was observed on *Xanthium strumarium* during the routine mycological survey in district Mandi of Himachal Pradesh, India. Morphological and microscopic examinations revealed the identity of powdery mildew as *Podosphaera xanthii*. The white powdery mildew infection was found mixed with brownish intercellular pycnidia during mycological examinations. These brown coloured pycnidia were picked up with the help of a needle under dissecting microspore and mounted in lactophenol cotton blue stain. Critical examinations identify it as a mycoparasite namely *Ampelomyces quisquali*. To best of our knowledge, this is the first report of mycoparasite *A. quisquali* on *X. strumarium* in India.

399. **Gautam, Ajay Kumar & Avasthi, S. 2017.** "*Uromyces trifolii*, a new addition to rust fungi of Himachal Pradesh, India, with a checklist of *Uromyces* in India". *Pl. Pathol. & Quatantine* 7(1): 1–14.

Abstract: *Uromyces* is a genus of rust fungi that infects both monocots and dicots throughout the world. The genus is particularly common on plant families like Asteraceae, Euphorbiaceae, Fabaceae, Liliaceae, Poaceae, and Loranthaceae. A rust infection was observed on leaves and stem of *Trifolium repens* from Himachal Pradesh, India. The symptoms appeared as dark brown to blackish brown pustules. Morphological and microscopic analyses of diseased samples identified it as *Uromyces trifolii*, which is new to Himachal Pradesh. Taxonomic descriptions and illustrations of the specimen are given. A checklist to assess diversity and distribution of the genus *Uromyces* in India is provided.

400. **Gautam, Ajay Kumar & Avasthi, S. 2017.** "Discovery of *Puccinia tiliaefolia* (Pucciniales) in northwestern Himalayas, India". *Polish Bot. J.* 62: 135–137.

Abstract: A rust infection was recently observed on *Grewia tiliifolia* Vahl during an exploration of rust fungi in Himachal Pradesh, India, in October 2015. An examination identified the rust fungus as *Puccinia tiliaefolia* T. S. Ramakr. & Sundaram. This finding represents a new record for the northwestern Himalayas and the first finding of *Puccinia tiliaefolia* in India in the last 46 years. A geographical distribution map of *P. tiliaefolia* is presented.

401. **Gautam, Ajay Kumar & Avasthi, S. 2017.** "Fungi associated with *Pistacia integerrima* with a description of a new species and one new record from India". *Acta Mycol.* 52: 1–6.

Abstract: *Pistacia integerrima* is a deciduous tree species belonging to the family Anacardiaceae. The plant possesses numerous phytochemicals of ethno-medicinal importance. In a routine mycological survey carried out from July 2013 to June 2014,

leaves of *P. integerrima* were found infected with fungi causing rust and blight diseases. The morphological and microscopic observations revealed three fungi, namely *Skierka himalayensis*, *Pestalotiopsis* sp., and *Pileolaria pistaciae*, which were found to cause rust and blight diseases. One new species of rust fungi, namely *Skierka himalayensis sp*. nov., and *Pestalotiopsis* sp. are reported for the first time from India. The detailed descriptions and illustrations of these three phytopathogenic fungi are provided in this paper.

402. **Gautam, Ajay Kumar & Avasthi, S. 2018.** "Diversity of powdery mildew fungi from North Western Himalayan region of Himachal Pradesh- A checklist". *Pl. Pathol. & Quarantine* 8: 78–99.

Abstract: Powdery mildews are obligate biotropic fungal parasites responsible for disease on a wide range of host plants. They are easily recognizable as white powdery growth on leaves, shoots and sometimes on flowers and even on fruits. This checklist of powdery mildew fungi of Himachal Pradesh, India is based on an exhaustive bibliographic survey of the literature. Fifteen genera (*Blumeria, Erysiphe, Euoidium, Golovinomyces, Leveillula, Microsphaera, Neoerysiphe, Oidium, Oidopsis, Phyllactinia, Pleochaeta, Podosphaera, Pseudoidium, Sphaerotheca* and *Uncinula*) and 92 species of powdery mildew have been recorded from the state. About 168 plant species belonging to 122 genera and 49 families are infected by these fungi. Molecular studies of powdery mildew fungi from Himachal Pradesh are needed to revise and to classify these fungi in their correct taxonomic position.

403. **Gautam, Ajay Kumar & Avasthi, S. 2018.** "A new record to rust fungi of North Western Himalayas (Himachal Pradesh), India". *Studies in Fungi* 3(1): 234–240.

Abstract: A rust fungus occurring on bamboo leaves from Bilaspur, Himachal Pradesh, North India is described and illustrated. A critical morphological and microscopic examination revealed it to be *Kweilingia divina*. It is the synonym of *Dasturella divina*, the type species for the fungal genus *Dasturella*, named in 1943 from infected leaf samples of bamboo (*Bambusa* sp.). After conducting a literature survey it was found that this fungus is the first to be reported from North Western Himalayas. A detailed taxonomic description of this fungus along with its distribution is provided.

404. **Gautam, Ajay Kumar & Avasthi, S. 2019.** "A checklist of rust fungi Himachal Pradesh, India". *J. Threatened Taxa* 11(14): 14787–14926.

Abstract: An updated analysis of the diversity of rust fungi in Himachal Pradesh is provided herein as a product of field surveys of mycological analysis, and of all forms of published documentation and literature. The results of all forms of analysis revealed that Himachal Pradesh has 167 species of rust fungi belonging to the class Pucciniomycetes. The class is represented by 11 families, 23 genera with 167 species. The *Pucciniaceae* (96 species) followed by *Phragmidiaceae* (14 species) are

the largest families of rust fungi reported from the state. Rest of the families were found associated with 1–10 species of rust fungi. The rust fungi (19 species) with uncertain placement are placed in incertae sedis. The rust genera reported from Himachal Pradesh so far are *Aecidium*, *Chrysomyxa*, *Coleosporium*, *Frommea*, *Gymnosporangium*, *Kuehneola*, *Kweilingia*, *Melampsora*, *Monosporidium*, *Ochrospora*, *Peridermium*, *Phakopsora*, *Phragmidim*, *Pileolaria*, *Puccinia*, *Pucciniastrum*, *Pucciniostele*, *Ravenelia*, *Skierka*, *Uredinopsis*, *Uredo*, *Urocystis,* and *Uromyces*.

405. **Gautam, Ajay Kumar, Avasthi, S. & Bhadauria, R. 2015.** "A new species of *Scytalidium* from Himachal Pradesh, India". *J. New Biol. Rep.* 4(1): 7–10.

Abstract: *Scytalidium aeglicola* a new species from India is described and illustrated from Bilaspur, Himachal Pradesh. Fungus was collected from infected *Aegle marmelos* leaves. After comparison with different *Scytalidium* species available in literature, a close similarity was observed with *S. lignicola*, but differs in having larger size of arthroconidia and the conidia.

406. **Gupta, A.B. 1950.** "A contribution to the algal flora of Khajiar-Chamba State, Himachal Pradesh". *Proc. Natl. Acad. Sci. India* 20(3): 109–115.

407. **Gupta, G.C. 1969.** "Introduction of exotic conifers in Himachal Pradesh". *Indian Forester* 95(10): 670–678.

Abstract: Results of trials of exotic conifers carried out since 1902 by various workers indicate that Mexican pines are suitable for introduction in Himachal Pradesh. *Pinus patula, Larix leptolepis, Thuja plicata, Pinus hartwegii, Pinus syivestris, Cupressus arizonica, PseudoJuga taxifolia* and *Pinus laricio* appear to be suitable from 1200 to 2500 m elevation. *Taxodium distichum, Pinus radiata, Pinus sabiniana, Pinus pinea* and *Pinus montezumae* have not been found suitable. Only *Pinus sylvestris* of winter rainfall region has been successful though mortality is high.

408. **Gupta, Shashikant & Singh, K.P. 2013.** "Three new records of *Pertusaria* (Lichenized Ascomycota) from India". *Indian J. Forest.* 36(2): 301–304.

Abstract: The paper reports 3 species, viz., *Pertusaria endoxantha* Vain. from Tamil Nadu, *P. hartmannii* Mull. Arg. from Sikkim and *P. thiospoda* Knight. from Assam & Himachal Pradesh, as new records for Indian lichen flora. These are briefly described to facilitate their identification.

409. **Habib, Iqbal. 1993.** "Fresh water Chlorococcales from Shimla, Himachal Pradesh". *J. Econ. Taxon. Bot.* 17(3): 560–562.

Abstract: The present communication deals with the morphotaxonomic enumeration of fifteen taxa of order Chlococcales collected from different localities, situated in and around Shimla during 1991–1992. All these taxa have been recorded for the first time from this part of state. The following genera were represented. The number

in brackets indicates the number of taxa belonging to each genus. *Pediastrum* (1), *Tetraedron* (1), *Oocystis* (2), *Glaucocystis* (3), *Nephrocytium* (2), *Crucigenia* (1) and *Scenedesmus* (5).

410. **Habib, Iqbal. 1999.** "Desmids of Shimla, Himachal Pradesh". *Acta Bot.* 24(1): 119.

411. **Joshi, Pushpesh, Kumar, Brijesh, Shukla, A.N. & Srivastava, S.K. 2015.** "Vascular cryptogams of Cold Desert of Western Himalaya". *Phytotaxonomy* 15: 33–43.

Abstract: The present paper deals with the Vascular Cryptogams (ferns and fern allies) of Himalayan Cold Desert comprising Ladakh and Lahaul-Spiti areas of Trans-Himalaya. A total of 23 species of pteridophytes (21 ferns and 2 fern-allies), belonging to 16 genera under 10 families have been enumerated from the study area.

412. **Kamat, N.D. 1968.** "Algae of Shimla". *J. Bombay Nat. Hist. Soc.* 65(1): 271–277.

Abstract: In this paper 78 taxa belonging to Chlorophyceae, Charophyceae, Xanthophyceae, Euglenophyceae and Cyanophyceae are recorded from Shimla.

413. **Kant, Rajni, Kharkwal, Kapil, Sinha, B.P., Ambrish, K., Bisht, Kapil & Sinha, G.P. 2019.** "Three new records for lichen biota of Himachal Pradesh, India". *Indian J. Forest.* 42(2): 195–198.

Abstract: Three species, viz., *Parmotrema saccatilobum* (Taylor) Hale, *Pyxine* cocoes (Sw.) Nyl and *Ramalina inflata* (Hook.f. & Taylor) Hook.f. & Taylor are reported new to lichens of Himachal Pradesh. They are described here with diagnostic characters, ecology and photographs to facilitate their identification.

414. **Kaur, M., Kaur, R., Singh, A.P. & Dhingra, G.S. 2018.** "Some noteworthy additions to family Phanerochaetaceae from district Shimla (Himachal Pradesh)". *J. New Biol. Rep.* 7(1): 38–49.

Abstract: Nine resupinate, non-poroid species namely, *Byssomerulius corium* (Pers.) Parmasto, *Candelabrochaete verruculosa* Hjortstam, *Phanerochaete leptoderma* Sheng H. Wu, *Phanerochaete singularis* (G. Cunn.) Burds., *Phanerochaete sordida* (P. Karst.) J. Erikss. & Ryvarden, *Phlebiopsis flavidoalba* (Cooke) Hjortstam, *Steccherinum albofibrillosum* (Hjortstam & Ryvarden) Hallenb. & Hjortstam, *Steccherinum bourdtii* Saliba & A. David and *Steccherinum cremicolor* H.S. Yuan & Sheng H. Wu are described and illustrated from district Shimla (Himachal Pradesh). Of the described species, eight i.e. *Byssomerulius corium, Candelabrochaete verruculosa, Phanerochaete leptoderma, Phanerochaete singularis, Phlebiopsis flavidoalba, Steccherinum albofibrillosum, Steccherinum bourdtii* and *S. cremicolor* are being described for the first time from Himachal Pradesh. All the nine species are new records for the study area. It is pertinent to mention that *Steccherinum cremicolor* is being described as a new record for India. A key to the genera and species, including earlier reports, of family Phanerochaetaceae from district Shimla is also provided.

415. **Khullar, S.P. 1994.** *Illustrated Fern Flora of the West Himalaya*. Vol. 1. International Book Distributors, Dehra Dun.

416. **Khullar, S.P. 1995.** "List of the ferns of Himachal Pradesh, NW Himalaya". *Indian Fern J.* 12(1-2): 177–187.

Abstract: A comprehensive list of the ferns of Himachal Pradesh based on fresh collections, studies of various herbaria and reports in literature have been prepared. The doubtful/excluded species have been marked by an asterisk.

417. **Khullar, S.P. 2000.** *Illustrated Fern Flora of the West Himalaya*. Vol. 2. International Book Distributors, Dehra Dun.

418. **Khullar, S.P. & Sharma, S.S. 1987.** The Ferns of Western Himalaya (excluding Uttarakhand). In: Pangtey, Y.P.S. & Joshi, S.C. (Eds.), *In Western Himalaya Environment Problems and Development*. Vol. I. Gyanodaya Prakashan, Nainital. Pp. 310–346.

419. **Khullar, S.P. & Verma, S. 2014.** "Some additions to the pteridophyte flora Himachal Pradesh (W. Himalaya)". *Indian Fern J.* 31: 102–111.

Abstract: Extensive explorations undertaken for the preparation of a Pteridophytic flora of Himachal Pradesh have resulted in the collection of four fern species not previously recorded from Himachal Pradesh. These are: *Leptochilus ellipticus* (Thunb.) Noot., *Tomophyllum donianum* (Spreng.) Fraser-Jenkins & Parris, *Vittaria linearifolia* Ching and *Cryptogramma stellari* (S.G. Gmel.) Prantl. New localities have been found for *Microlepia setosa* (Sm.) Alston and *Oleandra wallichii* (Hook.) C. Presl. A correction has been made for the report of *C. stellari* by Alka *et al*. 2010.

420. **Khullar, S.P. & Verma, S. 2016.** "The genus *Osmunda* and the oddities in W. Himalayan *Osmunda claytoniana* L. and the existence of *O. regalis* in India still remains an unsolved mystery!– A discussion". *Indian Fern J.* 33: 142–163.

Abstract: *Osmunda claytoniana*, the interrupted fern, usually has some fertile intermediary pinnae, which are placed in an intermediate position between sterile pinnae (above and below). During collections from Mani Mahesh (Himachal Pradesh) some very odd specimens of this fern were noticed. In these the sporangia were borne in very queer positions. These are being described, and discussed. The strange case of 'abnormal' fronds only in *O. japonica* needs an indepth study of such plants. It needs be clarified still if both types of fronds (so-called 'japonica' stage i.e. dimorphic fronds; and semi-fertile i.e. upper portion fertile and lower sterile, so called 'regalis' stage) occur on the same rhizome simultaneously, or the same rhizome produces both types of fronds at different times (early spring/late spring)? The cytology of these types needs to be studied to determine their nature. Natural hybrids in *Osmunda* have now been found in Japan. Quite strangely, dimorphic fronds have never been recorded in *O. regalis*. The entire *japonica-regalis* complex requires an in-depth study.

The occurrence or otherwise of *O. regalis* in India is still a mystery and requires a relook. Rcenetly, an issue has cropped up regarding the hypothesis of genomic stasis in the royal ferns and such curiosity driven research in Osmundaceae is to be expected in the future.

421. **Khullar, S.P. & Verma, S.K. 2010.** The pteridophytes of Mandi district (Himachal Pradesh). In: Tiwari, L.M., Pangtey, Y.P.S. & Tewari, G. (Eds.), *Biodiversity Potentials of Himalaya*. Gyanodaya Prakashan, Nainital. Pp. 43–62.

422. **Khullar, S.P., Baghla, A. & Verma, S. 2008.** The pteridophytic wealth of the district Solan (Himachal Pradesh, India). In: Verma, S.C., Khullar, S.P. & Cheema, H.K. (Eds.), *Perspectives in Pteridophytes*. Bishen Singh Mahendra Pal Singh, Dehra Dun. Pp. 96–111.

423. **Khullar, S.P., Sharma, S.S. & Chaudhary, V. 1989.** Ferns of Shimla Hills. In: Shah, N.K. (Ed.), *Western Himalaya Part–II*. Shree Almora Dept Publishers, Almora, pp. 242–272.

424. **Khullar, S.P., Sharma, S. & Prasher, I.B. 2008.** "Diversity in the pteridophytes of Kangra district (Himachal Pradesh)". *Proc. Natl. Acad. Sci. India* 78(1): 1–36.

Abstract: A comprehensive survey of the Pteridophytes of the Kangra district of Himachal Pradesh (India) has been carried out for the first time. Based on personal collections, reports in literature and study of herbarium specimens 130 species are being recorded. In Kangra district 45 species of Pteridophytes are rare; 22 are uncommon; 17 are occasional; 20 are very common: 14 are common and 12 are fairly common. Three natural fern hybrids have been collected from this district. Three fern species are being reported for the first time from Himachal Pradesh.

425. **Khullar, S.P., Chadha, J., Baghla, A. & Verma, S. 2009.** "Annoted inventory of the pteridophytes of Sirmaur district (Himachal Pradesh), West Himalaya". *Indian Fern J.* 26: 79–106.

Abstract: A first time comprehensive survey of district Sirmaur revealed the presence of 110 taxa of pteridophytes. Between the years 1831-1839, two species were listed from here, to which, later on, some common ferns were added. Only two species, *Dryopteris panda* (collected by Vicary in 1831) but believed to be a doubtful record, and *Ceratopteris thalictroides* (possibly extinct here) could not be collected.

426. **Khullar, S.P., Chadha, J., Baghla, A. & Verma, S. 2009.** "The pteridophytes of Sirmaur district (Himachal Pradesh)– An enumeration". *J. Indian Bot. Soc.* 88(3&4): 190-226.

Abstract: The pteridophytes of Sirmaur district have been poorly surveyed. The catalogue of ferns that lists the collections of the early European collectors between 1831 and 1889 contains only two records of fern from Sirmaur. These are *Polystichum*

bakerianum (Atkins. ex Clarke) Diels from Chur Mountain by Herschel in 1877 and *Dryopteris panda* (Clarke) Christ by Vicary in 1832 (CAL). A few stray reports mentioning some common ferns can be found in the early (1867-1921) and recent works. The present inventory containing 108 species represents the first comprehensive survey of Pteridophytes of Sirmaur district. Only two species reported in the earlier works could not be collected, *Dryopteris panda* (Collected by Vicary in 1831), is believed to be a wrong entry. *Ceratopteris thalictroides* has possibly become extinct from this area.

427. **Kumar, Aditya, Bhatti, S.K. & Aggarwal, A. 2012.** "Biodiversity of endophytic mycorrhiza in some ornamental flowering plants of Solan, Himachal Pradesh". *Biol. Forum- An Int. J.* 4(2): 45–51.

Abstract: Arbuscular mycorrhizae (AM) are the important mutualistic symbionts of the soil edaphon in most agro-ecosystems. The present experiment was conducted in 2011-2012 to investigate the AM fungal status (AM root colonization, AM spore count and AM diversity) of fifteen ornamental flowering plants. AM root colonization ranged from 14.28 ± 2.08 to 100.00 ± 0.0 percent and AM spores in the rhizospheric soil of different ornamental plants also varied significantly. Maximum AM root colonization and spore count was observed in *Senecio cineraria* (100.00 ± 0.0) and *Gladiolus grandiflorus* (172.00 ±4.35) respectively. Twenty three different species of AM fungi belonging to five genera i.e. *Glomus, Acaulospora, Sclerocystis, Gigaspora* and *Entrophospora* were reported. *Glomus* was reported to be dominant genera followed by *Acaulospora*. The study confirmed that biodiversity of arbuscular mycorrhizal fungi differ in different plant species.

428. **Kumar, Ashok & Kumar, Shailendra. 2006.** "New record of a Polyporale from Himachal Pradesh". *Indian Forester* 132(8): 1066–1067.

Abstract: The present paper describes a new record of a macro-fungus, *Sparassis crispa* Wulf ex Fr. Growing individually near healthy Deodar (*Cedrus deodara*) from Himalayan Forest Research Institute, Shimla, Himachal Pradesh. Earlier this species was reported from coniferous forest in Bhaderwah, Jammu & Kashmir and Darjeeling.

429. **Kumar, B., Pande, H.C. & Kumar, R. 2013.** "Rediscovery and new locality record of *Botrychium multifidum* (Pteridophyta-Botrychiaceae) after 124 years from Himachal Pradesh". *Indian J. Forest.* 36(7): 97–100.

Abstract: *Botrychium multifidum* (S.G. Gmel.) Rupr. A critically endangered fern of Western Himalaya was earlier reported from Shimla district of Himachal Pradesh. The authors have collected this fern after a gap of 124 years from Solang valley, Manali.

430. **Kumar, B., Pande, H.C., Dwivedi, H. & Kumar, R. 2013.** "Distributional record of new Basket Fern (*Drynaria propinqua*) from Himachal Pradesh". *Indian Forester* 139(7): 663–665.

Abstract: A new basket fern, *Drynaria propinqua* (Wall. ex Mett.) J. Sm. ex Bedd. has been reported for the first time for Himachal Pradesh from way to Shoja from Sainj, Ani village, Kullu district. This fern earlier reported from Assam, Uttarakhand, Meghalaya, Nagaland, Manipur, Sikkim, Tripura and West Bengal.

431. **Kumar, B., Pande, H.C., Dwivedi, H. & Kumar, R. 2013.** "An unusual division in fronds of *Polystichum stimulans* (Kuntze ex Mett.) Bedd.". *J. Non-Timber Forest Prod.* 20(1): 55–57.

Abstract: *Polystichum stimulans* (Kuntze ex Mett.) Bedd. is a unipinnate lithophytic fern. Plant with unusual 3-4 times division of frond was collected from Rohru, Shimla (H.P.). The possible cause of unusual division of frond might be due to cell necrosis and which has caused long cracking of apical meristem tissue resulted into the division of rachis to several times.

432. **Kumar, R., Seth, M.K. & Suseela, M.R. 2012.** "Chlorophyceae of district Kangra of Himachal Pradesh". *Phykos* 42(2): 35–38.

Abstract: In the present paper 38 taxa of class Chlorophyceae belonging to 19 genera, 6 orders and 12 families have been listed out from Kangra district of Himachal Pradesh. All these were first reports to Himachal Pradesh.

433. **Kumar, S. & Sohi, H.S. 1966.** "New records of fleshy fungi from Himachal Pradesh". *J. Indian Bot. Soc.* 45(1-4): 287–292.

Abstract: In the present paper ten fleshy fungi have been described, out of which *Aleuria wisconsinensis* Rehm, *Elvela caroliniana* (Bosc) Nees, *Discina apiculata* (Cooke) Seaver, *Peziza proteana* (Boud.) Seaver and *Peziza abietina* Pers. are new records for India, while *Peziza badio-confusa* Korf, *P. brunneoatra* Desm., *P. melaleuca* (Bres.) Seaver *sensu* Seaver, *P. pustulata* Pers. ex Fr. and *Melastiza charteri* (W.G. Smith) Boud. are being recorded for the first time in Himachal Pradesh. None of these species are edible. The specimens collected for the first time from India.

434. **Kumar, Sujeet & Singh, D.K. 2003.** "Contribution to the bryoflora of Grreat Himalayan National Park, Kullu, Himachal Pradesh, India– III. Musci". *Phytotaxonomy* 3: 53–59.

Abstract: Ten species of mosses, viz. *Atrichum undulatum* (Hedw.) P. Beauv. var. *hausknechtii* (Jur. et Mild.) Frye (Polytrichaceae), *Funaria hygrometrica* Hedw. (Funariaceae), *Timmia megapolitana* Hedw. (Timmiaceae), *Rhodobryum giganteum* (Schwaegr.) Par. (Bryaceae), *Bartramidula bartramioides* (Griff.) Wijk & Marg. (Bartramiaceae), *Plagiothecium neckeroideum* B.S.G. (Plagiotheceaceae), *Hypnum cupressiforme* Hedw. (Hypnaceae), *Entodon rubicundus* (Mitt.) Jaeg. (Entodontaceae),

Regmatodon orthostegius Mont. (Regmatodontaceae) and *Barbula constricta* Mitt. (Pottiaceae) have been described for the first time from the Great Himalayan National Park, Himachal Pradesh.

435. **Kumari, A., Datta, A. & Uniyal, S.K. 2012.** "*Cryptogramma stellari* (Gmel) Prantl.– A new fern record for Himachal Pradesh". *Indian J. Forest.* 35(3): 393–395.

Abstract: The paper reports additions of *Cryptogramma stellari* (Gmel) Prantl. to the fern flora of Himachal Pradesh from Jhondi, Dhauladhar Mountain range, Kangra district.

436. **Kumari, A., Lal, B. & Fraser-Jenkins, C.R. 2010.** "*Microlepia setose* (Sm.) Alston– A new generic record in the pteridophytic flora of Himachal Pradesh, India". *Indian Fern J.* 27: 376–382.

Abstract: This paper reports the occurrence of *Microlepia*, a new pteridophytic generic record in the flora of Himachal Pradesh, India with the discovery there of *M. setosa* (Sm.) Alston. This species was initially collected as a rarity from the IHBT campus, Palampur, and was found a second time occurring abundantly at Banuri, near to Palampur, both in Kangra district, Himachal Pradesh. The species and genus were hitherto unknown to the fern flora of Himachal Pradesh. Details are given of its nomenclature, morphological distinction, range and habitat.

437. **Kumari, A., Lal, B. & Parkash, O. 2013.** "Pteridophytic diversity of Barot, Mandi district, Himachal Pradesh, India". *J. Bombay. Nat. Hist. Soc.* 110(2): 135–141.

Abstract: This communication provides an inventory of the pteridophytes of Barot in the Uhl Valley of Mandi district, Himachal Pradesh, based on extensive field surveys carried out during 2010-2011. Ninety species of pteridophytes (85 ferns and 5 fern-allies) belonging to 31 genera and 14 families were recorded, which represents about 95% of the pteridophytic flora of Mandi district, and 35% of fern and fern-allies of Himachal Pradesh. Information on the species diversity, habitat, and current status of the taxa based on the survey are provided in this paper. Besides collecting voucher specimens of all the 90 species encountered for herbarium, live collections of 80 species of ferns and fern-allies were collected and introduced in the fernery of the institute for conservation and multiplication purposes, and most have been successfully established *ex-situ*. Strategies for bioprospection of selective species, and conservation of some rare threatened species are also discussed.

438. **Kumari, A., Sangta, R.P. & Chawla, A. 2013.** "Diversity, distribution pattern and threat status of pteridophytic flora in Shikari Devi Wildlife Sanctuary, Himachal Pradesh, India". *J. Biodiv. Manage. & Forest.* 2(4):1–7.

Abstract: The Protected Area (PA) is one of the *in-situ* conservation measures adopted globally for the conservation of species, habitats and ecosystems. Shikari Devi Wildlife Sanctuary (SDWLS) is one of the diverse evergreen protected forests situated in

Mandi district of Himachal Pradesh, India. Review of literature reveals that the SDWLS has not been explored for pteridophytic flora so far. Therefore, the present study was undertaken to document the detail inventory of the pteridophytes growing naturally at different sites of SDWLS. In this context, extensive field surveys were carried out to understand the diversity, distribution pattern and their threat status. The present study reveals total 105 species (100 ferns and 5 fern allies) belonging to 33 genera and 15 families. It represents about 95 % of the pteridophytic flora of Mandi district and 40 % of that of the state of Himachal Pradesh. Information on habitat and distribution within the study area along with their altitudinal gradient and herbarium numbers are also provided in this paper.

439. **Kumari, A., Chawla, Amit, Lal, B. & Fraser-Jenkins, C.R. 2014.** "*Dryopteris zayuensis* Ching & S.K. Wu and *Pteris biaurita* L. subsp. *fornicata* Fraser-Jenk.– Two interesting records in the pteridophytic flora of Himachal Pradesh, India". *Indian J. Forest.* 37(1): 115–120.

Abstract: This paper reports the occurrence of *Dryopteris zayuensis* Ching & S.K. Wu and *Pteris biaurita* L. subsp. *fornicata* Fraser-Jenk. in Himachal Pradesh. The first one is a rare species while the latter forms a new record for Himachal Pradesh.

440. **Kumari, A., Parkash, O., Kumar, A., Uniyal, S.K., Gopichand, Lal, B. & Singh, R.D. 2010.** "Ferns and fern allies of IHBT campus, Palampur, Himachal Pradesh". *Indian Fern J.* 27: 53–64.

Abstract: The present communication provides an inventory of the pteridophytes growing naturally at different sites in the campus of the Institute of Himalayan Bioresource Technology (IHBT), Palampur, Kangra district, Himacha Pradesh. In order to document the natural plant resources found within the campus of the institute, extensive surveys were carried out to understand the diversity of its ferns and fern-allies. The present study reveals 40 species (38 ferns and 2 fern allies) belonging to 21 genera and 13 families. It represents about 30% of the pteridophytic flora of Kangra district and 15% of that of the state of Himachal Pradesh. Information on species richness, habitat and current status within the study area, along with their economic importance is provided. Strategies to conserve some rare and valuable taxa have also been suggested.

441. **Mehra, P.N. & Dhir, K.K. 1968.** "Ferns and fern-allies of Dalhousie hills". *Bull. Bot. Surv. India* 10(3-4): 296–308.

Abstract: The paper deals with the ecological distribution and enumeration of species of ferns and fern-allies from the Dalhousie hills covering an area of 170 sq. km and altitudinal range between 600-3,000 m. A total of 88 species of ferns and 6 of fern-allies have been reported. *Athyrium proliferum*, *A. gymnogrammoides*, *A. mackinnoni* and *Polypodium sub-amoenum* are first records from the area.

442. **Mishra, B.M., Rawat, P.S. & Khaneja, A.K. 2003.** "*Bifussella saccata* on *Pinus wallichiana*: Anew host record from Himachal Pradesh". *Indian Forester* 129(10): 1293–1294.

Abstract: The present study deals with distribution, incidence and description of fungus *Bifusella saccata* Darker as occurred on *Pinus wallichiana*. This is the first record of the fungus on *P. wallichiana* from Himachal Pradesh.

443. **Mishra, D. & Sharma, J.R. 2012.** "Diversity in Poltporaceous mycoflora of Himalaya". *Ann. Forest.* 20(1): 125–128.

Abstract: Polypores are a dominant and economically important group of wood-rooting fungi in Himalayan forests. This paper deals with the concise account of their distribution, ecology and host specificity based on the materials studied in various Indian herbaria and the vast survey of these fungi by the authors from Eastern Himalaya (Sikkim, Arunachal Pradesh and northern part of West Bengal) and Western Himalaya (Jammu & Kashmir, Uttarakhand and Himachal Pradesh) during the past 30 years.

444. **Misra, P.K., Dwivedi, Rakesh Kumar & Shukla, C.P. 2006.** "Some fresh-water desmids from district Mandi, Himachal Pradesh". *Phytotaxonomy* 6: 120–125.

Abstract: Present communication deals with 17 taxa of family Desmidiaceae of class Chlorophyceae. These algae have been collected from different localities in Byas River and Nalsar Lake of Mandi district of Himachal Pradesh. The genus C*osmarium* Corda ex Ralfs is represented by 15 species and genus *Euastrum* Ehrenberg has 2 species. These algae are being reported for the first time from this area.

445. **Mohan, N.P. 1933.** "Ecology of *Pinus longifolia* in Kangra and Hosiarpur forest divisions". *Indian Forester* 59(12): 812–826.

Abstract: Life history of *Pinus longifolia* is given in Section II and it is suggested that the Silvicultural operations should take into consideration the life processes. For determining the types of vegetation the 'degree of wetness' during the dry months should be determined rather than the annual rainfall. *Chil* and scrub forest type of Kangra and Hoshiarpur divisions are given in detail and it is shown that silvicultural treatment should be determined and modified according to the type encountered.

446. **Mohan, N.P. & Puri, G.S. 1956.** "The Himalayan conifers-V. The succession of forest communities in Chir pine (*Pinus roxburghii*) forests of the Punjab and Himachal Pradesh". *Indian Forester* 82: 52–91.

Abstract: Forest communities in the Chir pine forest of the Punjab and Himachal Pradesh have been studied in detail. The three forest types of Mohan have been reclassified into six for the purpose of giving a correlation between the vegetation and soil features and to indicate successional trends. Brief description of these types is given

and the trend of succession in these forest communities is described in some detail. Soil profile from the six types have also been studied.

447. **Mongra, A.C. 2012.** "Distribution pattern of Cyanobactria in hot water springs of Tattapani, Himachal Pradesh, India". *J. Acad. Indus. Res.* 1(7): 363–370.

Abstract: The water samples from hot water springs of Tattapani, HP, India were analysed for distribution pattern of cyanobacteria. Results revealed that the hot water springs which are a good medium containing all essential inorganic ions supports considerable growth of both nitrogen and non-nitrogen fixing cyanobacteria. However, the water of spring used in lab for growth of cyanobacteria does not support their growth. Along the temperature gradient from 65°C to 35°C, the water showed a gradual decrease in salt residue per unit volume. This indicates that the decrease in water temperature leads to salt precipitation. These changes in the quality of water and variation of temperature along the spring affected the distribution and occurrence of cyanbacterial population.

448. **Narayan, Binita, Karunakaran, P.V. & Singh, D.K. 2001.** "Contribution to the bryoflora of Great Himalayan National Park, Kullu, Himachal Pradesh– I". *Indian J. Forest.* 24(2): 265–278.

Abstract: The paper describes eight species of bryophytes, viz., *Homomallium simalaense* (Mitt.) Broth., *Frullaria muscicola* St., *Mnium cuspidatum* Hedw., *M. rostratum* Shrad., *Porella caespitans* (St.) Hatt., *P. gracillaima* Mitt., *Pseudoleskella catentula* (Brid. ex Schrad.) Kindb. and *Rhodobryum roseum* (Hedw.) Limpr. from Great Himalayan National Park, Kullu district, Himachal Pradesh.

449. **Nayaka, S., Upreti, D.K. & Yadav, V. 2002.** "An enumeration and new records of lichens from Sirmaur district, Himachal Pradesh (H.P.), India". *Phytotaxonomy* 2: 49–63.

Abstract: The paper enumerates 112 species of lichens belonging to 26 families and 44 genera in five reserve forest localities of Sirmaur district, Himachal Pradesh. The study has added 54 species to the earlier known lichen flora of the state, of which *Lecanora achroa* Nyl., *L. flavidofusca* Mull.-Arg., *L. helva* Stizenb., *L. interjecta* Mull.-Arg., *L. queenslandica* Knight and *L. tropica* Zahlbr. are new records to India.

450. **Nayaka, S., Yadav, V., Srivastava, R. & Upreti, D.K. 2002.** "An enumeration and new records of lichens from Solan district, Himachal Pradesh (H.P.), India". *Biol. Mem.* 28(1): 25–33.

451. **Negi, H.C. 2009.** *Some common pteridophytes and gymnosperms of district Kinnaur (Himachal Pradesh)*. Ph. D. Thesis, Himachal Pradesh University, Summer Hill, Shimla (Unpublished).

452. **Pangtey, Y.P.S., Tewari, L.M. & Upreti, Kanchan. 2009.** "*Osmunda claytoniana* L. subsp. *vestita* (Wall. ex Milde) A. Love & D. Love (Osmundaceae: Pteridophyta)–

Hitherto unknown name in the fern flora of the West Himalaya". *J. Econ. Taxon. Bot.* 33(1): 44–46.

Abstract: This paper records for the first time hitherto unknown name as *Osmunda claytoniana* L. subsp. *vestita* (Wall. ex Milde) A. Love & D. Love in the fern flora of west Himalaya.

453. **Pangtey, Y.P.S., Tewari, L.M. & Upreti, Kanchan. 2009.** "Taxonomic notes on some West Himalayan ferns". *J. Econ. Taxon. Bot.* 33(1): 47–50.

Abstract: This paper reports the correct identity of four species of ferns from the west Himalaya and suggests that these erroneously reported species be considered the excluded species in the western Himalayan fern literature. Four fern species viz., *Botrychium lunaria* (L.) Sw. var. *onondagense* (Underw.) House (Botrychiaceae) was corrected as *Botrychium lunaria* (L.) Sw., *Plagiogyria scandens* Mett. (Plagiogyriaceae) to *Plagiogyria euphlebia* (Kunze) Mett., *Loxogramme parallela* (Loxogrammaceae) to *Loxogramme chinensis* Ching and *Pteris pseudoquadriaurita* Khullar (Pteridaceae) to *Pteris aspericaulis* Wall. ex Agardh. *Plagiogyria euphlebia, Loxogramme chinensis* and *Pteris aspericaulis* are being reported authentically from the west Himalaya.

454. **Pathania, Jyoti & Chander, Hem. 2018.** "Notes on some common macrofungi of Hamirpur region, Himachal Pradesh". *CPUH Res. J.* 3(2): 191–201.

Abstract: Macrofungi are among the most mysterious life forms. These include fungi with the macroscopic fructifications/thalli. Macrofungi have perhaps the longest history of diversity studies, however, these still remain under studied over most of the parts of the World. Macrofungi of India, North Western Himalaya and Himachal Pradesh was explored by various workers, however diversity of macrofungi in Hamirpur region is still data deficient and under studied. Only twenty two species of macrofungi have been reported so far from Hamirpur district by earlier researchers. During the present study, eighteen species (*Auricularia auricular-judae, Bovista pusilla, Daldinia concentrica, Ganoderma applanatum, G. lucidum, Hexagonia tenuis, Lenzites acuta, Phellinus everhartii, P. ferreus, P. gilvus, Pleurotus ostreatus, Polyporus grammocephalus, Schizophyllum commune, Trametes pubescens, T. versicolor, T. villosa, T. elegans* and *Tyromyces chioneus*) of macrofungi were identified, which are collected from various localities and substrates in Hamirpur region. Out of these, twelve species have been reported for the first time from the study area.

455. **Pathania, Jyoti & Chander, Hem. 2018.** "Nutritional qualities and host specificity of most common edible macrofungi of Hamirpur district, Himachal Pradesh". *J. Biol. Chem. Chron.* 4(2): 86–89.

Abstract: This paper analyses nutritional qualities and host specificity of most common edible macrofungi of Hamirpur district, Himachal Pradesh. During the ongoing studies on diversity of macrofungi, specimens of edible fungi were randomly collected from

twelve localities (viz. Chheorin, Doh, Baru, Bohni, Saloni, Bhota, Tikkarkhattriyan, Kohin, Tikkar-sujanpur, Doli-sujanpur, Harson and Fafan) of Hamirpur region and five species of most common edible macrofungi viz. *Auricularia auricula-judae, Ganoderma applanatum, Ganoderma lucidum, Pleurotus ostreatus* and *Schizophyllum commune* were identified. The chemical composition of these macrofungi include ash, protein, fats, carbohydrates, glucose, mannose, xylose, galactose, amino acids, fibre, phosphorus, magnesium, calcium, iron, zinc, magnesium, copper and chromium. Among these macrofungi, *Auricularia auricula- judae* is rich in carbohytdates (66.1%) and glucose (15%), *Schizophyllum commune* is rich in fats (4.5%), *Ganoderma lucidum* is rich in fibres (59%) and *Pleurotus ostreatus* is rich in protein (25.91%). These pathogenic macrofungi infect and grow over fifteen tree hosts viz. *Acacia catechu, Bauhinia variegata, Bombax ceiba, Citrus pseudolimon, Dalbergia sissoo, Dendrocalamus* sp., *Ficus benghalensis, Grewia optiva, Magnifera indica, Melia azedarach, Morus alba, Pyrus pashia, Tamarindus indica, Toona ciliata* and *Zizyphus jujube* in the study area. Among these host trees, *Bauhinia variegata* is infected maximum by four species of macrofungi except for *Pleurotus ostreatus* which is host specific and infects only *Melia azedarach*.

456. **Prasher, I.B. & Ashok, D. 2013.** "A checklist of wood-rotting fungi (non-gilled Agaricomycotina) of Himachal Pradesh". *J. New Biol. Rep*. 2(2): 71–98.

Abstract: Three hundred fifty five species of wood rotting fungi (non-gilled Agaricomycotina) are being recorded from state of Himachal Pradesh. These belong to 37 families spreading over 133 genera. These are recorded from 8 districts (Chamba, Kangra, Kinnaur, Kullu, Shimla, Solan, Bilaspur, and Mandi) of the study area. District Bilaspur and Mandi of Himachal Pradesh have been surveyed for the first time.

457. **Prasher, I.B. & Ashok, D. 2013.** "A checklist of Wood Rotting Fungi (non–gilled Agaricomycotina) of Himachal Pradesh". *J. New Biol. Rep*. 2(2): 71–98.

Abstract: Three hundred fifty five species of wood rotting fungi (non-gilled Agaricomycotina) are being recorded from state of Himachal Pradesh. These belong to 37 families spreading over 133 genera. These are recorded from 8 districts (Chamba, Kangra, Kinnaur, Kullu, Shimla, Solan, Bilaspur, and Mandi) of the study area. District Bilaspur and Mandi of Himachal Pradesh have been surveyed for the first time.

458. **Prasher, I.B. & Chander, H. 2005.** "Lichens of Himachal Pradesh–I". *Panjab Univ. Res. J. (Sci.) 55*(1&2): 109–129.

Abstract: Thirty species of lichens belonging to the lichen families Candelariaceae, Chrysothriaceae, Cladoniaceae, Hymeneliaceae, Lecanoraceae, Parmeliaceae, Pertusariaceae, Physciaceae, Porpidiaceae, Ramalinaceae, Teloschistaceae and

Verrucariaceae are being described and illustrated from Kullu district of Himachal Pradesh.

459. **Prasher, I.B. & Manju. 2017.** "Isolation, molecular characterization and qualitative screening for lignocellulolytic enzymes of *Porostereum spadiceum*: A new record of corticoid basidiomycetes from district Hamirpur (H.P.)". *J. New Biol. Rep.* 6(3): 129–133.

Abstract: *Porostereum spadiceum* (Pers.) Hjortstam & Ryvarden a corticoid basidiomycetes fungus has been isolated from bamboo culms collected from district Hamirpur (H.P.). It has not been reported from this district before. The identification of the isolate is confirmed by molecular characterization. The fungus exhibit both lignin modifying and cellulose degrading enzyme activity.

460. **Prasher, I.B. & Singh, G. 2014.** "Anamorphic fungi new to Shiwaliks– Northwest India". *J. New Biol. Rep.* 3(2): 141–145.

Abstract: Four species viz. *Sporidesmium brachypus, Sporidesmium vagum, Sporidesmium tropicale* and *Zygosporium oscheoides* are reported new to Shiwaliks.

461. **Prasher, I.B. & Sushma. 2016.** "Some Interesting Hyphomycetous fungi from Himachal Pradesh". *Kavaka* 46: 23–26.

Abstract: In this paper four species of hyphomycetes, namely *Vanakripa menglensis* D.M. Hu, L. Cai & K.D. Hyde, *Repetophragma inflatum* (Berk. & Ravenel) W.P. Wu, *Alysidium resinae* (Fr.) M.B. Ellis and *Fusariella concinna* (Syd.) S. Hughes has been described from Himachal Pradesh (North-Western Himalaya). *Vanakripa menglensis* and *Repetophragma inflatum* constitutes new record for India, while *Alysidium resinae* (Fr.) and *Fusariella concinna* are being reported for the first time from North-Western Himalayas.

462. **Prasher, I.B. & Sushma. 2017.** "Some records of Lichens new to India". *J. New Biol. Rep.* 6(1): 23–26.

Abstract: Four species of lichens viz. *Leptogium papillosum, Melaspilea lentiginosa, Physconia pulverulenta, Pyrenopsis furfurea* are being described and illustrated from different localities of North-Western Himalayas. Detailed description (morphological and anatomical) along with the chemistry, distribution and substrate specificity are provided.

463. **Prasher, I.B. & Verma, R.K. 2012.** "*Periconia* species new to North Western Himalaya". *J. New Biol. Rep.* 1(1):1–2.

Abstract: Two species of the anamorphic fungus *Periconia* Tode ex Fries were collected from the Himachal Pradesh (North-Western Himalayas). *Periconia lateralis* Ellis & Everh. and *Periconia digitata* (Cooke) Sacc. are being described and illustrated. *Periconia*

lateralis is a new record for Himalayas where as *P. digitata* is a new record for North Western Himalayas.

464. **Prasher, I.B. & Verma, R.K. 2014.** "Four interesting Hyphomycetes from Himachal Pradesh". *J. New Biol. Rep.* 3(3): 159 –166.

Abstract: *Dictyosporium heptasporum* (Garov.) Damon, *Torula ellisii* Yadav & Lal, *Torula herbarum* (Pers.) Link and *Ceratosporium fuscescens* Schwein (anamorphic fungi-hyphomycetes), collected from Himachal Pradesh (North-Western Himalayas), are being described and illustrated. *Dictyosporium heptasporum* and *Torula ellisii* are being recorded for the first time from Himalayas.

465. **Prasher, I.B. & Verma, R.K. 2015.** "Two new species of *Acroconidiella* from India". *J. New Biol. Rep.* 4(2): 111–114.

Abstract: *Acroconidiella indica* sp. nov. and *A. manoharacharii* sp. nov. are being described and illustrated from Solan and Shimla districts of Himachal Pradesh respectively.

466. **Prasher, I.B. & Verma, R.K. 2015**. "Some new and interesting Hyphomycetes from North Western Himalayas, India". *Nova Hedwigia* 100(1-2): 269–277.

Abstract: *Neosporidesmium macrosporum* sp. nov. is described and illustrated from living and dead twigs of *Ficus infectoria* from Chandigarh along with *Haplotrichum curtisii*, *Pithomyces chartarum* and *Dictyosporium subramanianii* collected from Himachal Pradesh. *Haplotrichum curtisii* is reported for the first time from India whereas *Pithomyces chartarum, Dictyosporium subramanianii* are recorded for the first time from North-Western Himalayas.

467. **Prasher, I.B. & Verma, R.K. 2015.** "Two new species of *Dictyosporium* from India". *Phytotaxa* 204 (3): 193–202.

Abstract: Two species of *Dictyosporium* were collected from forests of Himachal Pradesh, India. *Dictyosporium indicum* sp. nov. and *D. hydei* sp. nov., found on a dead petiole of *Phoenix rupicola* and bark of *Tecoma stans*, respectively, are described and illustrated. The former species is characterized by conidia with sub-apical appendages while the latter has supra-basal conidial appendages. A synopsis of the genus is also provided.

468. **Prasher, I.B. & Verma, R.K. 2016.** "Hyphomycetes diversity of Himachal Pradesh–I". *J. New Biol. Rep.* 5(1): 52–58.

Abstract: *Dendryphiopsis atra* (Corda) S. Hughes, *Melanographium citri* (Gonz. Frag. & Cif.) M.B. Ellis, *Moorella speciosa* P. Raghuveer Rao and Dev Rao, *Sporoschisma mirabile* Berk. & Broome and *Virgaria nigra* (Link) Gray, collected from the various localities of Himachal Pradesh are being described and illustrated.

469. **Prasher, I.B., Baghla, A. & Khullar, S.P. 2004.** "VAM association in some ferns from Chail, Himachal Pradesh, NW Himalaya". *Indian Fern J.* 21: 144–149.

Abstract: Vesicular Arbuscular Mycorrhizal (VAM) association with the roots of ferns is a symbiotic association. Studies on VAM in thirteen fern taxa belonging to four families i.e. Adiantaceae Ching, Sinopteridaceae Koidzumi, Aspleniaceae Mett. ex Frank and Cryptogrammaceae Pichi Sermoli have revealed the presence of fungal mycelium which is generally branched and forms arbuscles, vesicles, H and Y-connections. Heavy arbuscular and vesicular infections occurred throughout the period of investigation. Several spore types were present in each rhizosphere.

470. **Prasher, I.B., Lalita & Ashok, D. 2011.** "Polyporoid fungi of district Bilaspur (Himachal Pradesh)". *J. Indian Bot. Soc.* 90 (3&4): 268–273.

Abstract: The hitherto unexplored Bilaspur district (H.P.) has been surveyed and ten species of Polyporoid fungi belonging to four families (Auriculariaceae, Ganodermataceae, Polyporaceae, and Steccherinaceae) and six genera (*Auricularia, Ganoderma, Lenzites, Polyporus, Trametes* and *Irpex*) are described and illustrated.

471. **Prasher, I.B., Lalita & Ashok, D. 2012.** "Polyporoid Fungi of district Mandi (Himachal Pradesh)". *J. Indian Bot. Soc.* 91(1-3): 204–212.

Abstract: The hitherto unexplored Mandi district (H.P.) has been surveyed and thirteen species of Polyporoid fungi belonging to five families (Hymenochaetaceae, Phanerochaetaceae, Polyporaceae, Schizophyllaceae and Steccherinaceae) and ten genera (*Phellinus, Phanerochaete, Daedalea, Gloeophyllum, Lenzites, Hexagonia, Trametes, Poria, Schizophyllum* and *Irpex*) are being recorded and described.

472. **Prasher, I.B., Manju & Sushma. 2016.** "New records of hyphomycetes fungi from North Western Himalayas, India". *J. New Biol. Rep.* 5(2): 87–92.

Abstract: Five anamorphic fungi viz. *Spadicoides bina*– a new record for India, where as *Cladosporium cucumerinum, Cryptocoryneum rilstonii, Ellisembia leptospora* and *Nalanthamala madreeya* as new records for the North-Western Himalayas are described, illustrated and discussed with remarks based on morphological characteristics.

473. **Prasher, I.B., Sharma, S. & Khullar, S.P. 2005.** "Mycorrhizal associates of some ferns from Kangra district (Himachal Pradesh)". *Indian Fern J.* 22: 81–86.

Abstract: Majority of vascular plants in a natural ecosystem have symbiotic associations with fungi. Studies were conducted on 18 species of ferns from Kangra district of Himachal Pradesh. Investigations reveal that roots of these ferns have vesicular arbuscular mycorrhizae and the levels of association varied between different species and even within the species of a genus. Changes in the level of infection were also noted with respect to seasons.

474. **Prasher, I.B., Singh, K.J. & Verma, R.K. 2014.** "Some interesting hyphomycetes from North-Western Himalayas". *J. New Biol. Rep.* 3(3): 295–298.

Abstract: *Corynespora calicioidea* (Berk. and Br.) M. B. Ellis, *Dictyoarthrinium sacchari* (J.A. Stev.) Damon and *Corynespora lanneicola* Deighton and M. B. Ellis. hyphomycetes collected from Uttarakhand and Himachal Pradesh (North- Western Himalayas), are being described and illustrated.

475. **Prasher, I.B., Singh, K.J. & Verma, R.K. 2014.** "Some interesting hyphomycetes from Himachal Pradesh, India". *J. New Biol. Rep.* 4(1): 90–93.

Abstract: *Myrothecium roridum* Tode, *Drechslera dematioidea* (Bubák & Wróbl.) Scharif, *Khuskia oryzae* H.J. Huds., and *Alternaria citri* Ellis & N. Pierce (anamorphic fungi-hyphomycetes) collected from Himachal Pradesh (North- Western Himalayas), are being described and illustrated.

476. **Prasher, I.B., Sushma & Verma, R.K. 2016.** "Hyphomycetes diversity of Himachal Pradesh–II". *J. New Biol. Rep.* 5(2): 75–80.

Abstract: *Pseudospiropes subuliferus* (Corda) M. B. Ellis, *Fusariella obstipa* (Pollack) Hughes, *Gyrothrix circinata* (Berk. & Curt.) Hughes, *Stachybotrys echinata* (Rivolta) G. Sm and *Stachybotrys levispora* (Subram.) Yong Wang bis, K.D. Hyde, McKenzie, Y.L. Jiang & D.W. Li, in Wang, Hyde, McKenzie, Jiang, Li & Zhao collected from the forests of Himachal Pradesh are being described and illustrated.

477. **Prasher, I.B., Sushma & Chander, H. 2016.** "New specific records of *Cladonia* from North-Western Himalayas, India". *J. New Biol. Rep.* 5(3): 170–177.

Abstract: Five species of lichen genus *Cladonia* i.e., *C. digitata, C. glauca, C. gracilis, C. parasitica,* and *C. uncialis* from North- Western Himalayas are reported as a new record for lichen flora of India and three species *C. bacillaris, C. floerkeana* and *C. praetermissa* var. *praetermissa* as new records for North India.

478. **Priyanka. 2012.** *Studies on Resupinate Polyporales (Agaricomycetes) of Himachal Pradesh.* Ph.D. Thesis. Punjabi University, Patiala. (Unpublished).

479. **Puri, G.S. 1950.** "The distribution of conifers in the Kulu Himalayas with special relation to geology". *Indian Forester* 76(4): 144–153.

480. **Rattan, S.S. 1977.** "The Resupinate Aphyllophorales of the North Western Himalayas". *Biblioth. Mycologica* 60: 1-427.

481. **Rawla, G.S. & Rattan, R.S. 1989.** *Scenedesmus* species from Punjab, Himachal Pradesh and Chandigarh". *J. Indian Bot. Soc.* 68(1-4): 287–293.

Abstract: A regional floristic account of 22 taxa of *Scenedesmus* is given from Punjab, Himachal Pradesh and Chandigarh. Fourteen taxa are new regional records while *S. incrassatulus* Bohlin and *S. denticulatus* Lagerheim var. *linearis* Hansgirg are new Indian records.

482. **Saini, M.K., Atri, N.S., Sharma, S. & Priya, J. 2010.** "Taxonomic studies on the genus *Russula* Pers. from Himachal Pradesh, India". *J. Mycol. Pl. Pathol.* 40(1): 52–54.

Abstract: Studies on taxonomy is essential to understand the biodiversity and conservation of species. Two species of the genus *Russula* Pers. belonging to order Russulales, family Russulaceae namely, *R. lepidicolor* Romagnesi and *R. azurea* Bres. are taxonomically investigated and reported for the first time from India. While *Russula lepidicolor* was found growing scattered in *Cedrus deodara* forest, *R. azurea* was found solitary under *Juniperus recurva*.

483. **Saini, S.S. & Atri, N.S. 1990.** "Two noteworthy taxa of *Lactarius* Pers. from India". *J. Indian Bot. Soc.* 69(3-4): 475–476.

Abstract: This paper gives an illustrated account of two taxa of *Lactarius* Pers., viz., *L. subisabellinus* var. *murrillianus* (Smith & Hesler) Hesler & Smith from Himachal Pradesh, Uttar Pradesh and Jammu & Kashmir and *L. subpurpureus* Peck from Uttar Pradesh and Jammu & Kashmir to the first time in India.

484. **Sareen, A., Ahirwar, R., Gautam, A. & Bhadauria, R. 2010.** "Fungal contamination of some common medicinal plant samples of Himachal Pradesh". *Sci. & Cult.* 76: 118–120.

Abstract: Bark, root, stem and leaves of ten medicinal plant samples collected from Himachal Pradesh, were studied for the occurrence of mycoflora and their related toxins. Species of *Aspergillus, Rhizopus* and *Penicillium* were found to be associated from all the samples. *Aspergillus niger* was found to be most frequently occurring fungal species. In the screening for the mycotoxin through BGY test only three samples gave fluorescence under UV light. Seven samples were found to be aflatoxin positive in TLC study.

485. **Schelpe, E.A.C.L.E. 1954.** "Ecological observations on pteridophyta in the Kangra Himalaya". *American Fern J.* 44(2): 49–65.

Abstract: The distribution of pteridophytes in the various vegetation types in the Kangra Himalaya is described. The deciduous habit in these ferns and the paucity of epiphytic species in this area are discussed.

486. **Seth, Amit, Seth, M.K. & Misra, P.K. 2006.** "A review of literature on algal flora of Himachal Pradesh". *Phytotaxonomy 5*: 35–57.

Abstract: Himachal Pradesh, which lies between 29°-35° latitude and 74°-81° longitude, is known for its vast and varied biodiversity. It has the privilege of snow-fed perennial rivers, streams and their rivulets or tributaries besides several wetlands/ lakes, tanks, springs/kunds, hot water springs and glaciers. The river basins and their catchment areas (55.673 km^2) are best suited units for environmental monitoring, management and development. Since scanty and scattered information is available

on the algal biodiversity, an attempt has been made in the present paper to compile all relevant literature on algal flora of Himachal Pradesh.

487. **Seth, M.K. & Kumar, S. 2002.** Pteridophytic flora of Bilaspur, Himachal Pradesh, Part-1: A general account of Bilaspur district amd 13 most common pteridophytes. In Prof. S.P. Khullar's Fesschrift Volume.

488. **Seth, M.K. & Kumar, S. 2005.** "Tracheary elements in pteridophytes of Bilaspur (Himachal Pradesh). Part–I: Length, breadth and length/breadth ratio of tracheids". *Indian Fern J.* 22: 128–136.

Abstract: Information about length, breadth and length/breadth ratio of tracheids of 13 species of pteridophytes of Bilaspur district (Himachal Pradesh) is presented. The species studied are; *Adiantum capillus-veneris* L., *A. incisum* Forsk., *A. lunulatum* Burm. f., *Asplenium dalhousiae* Hook., *Hypodematium crenatum* (Forsk.) Kuhn ex V. Deck., *Equisetum arvense* L., *Marsilea minuta* L., *Pteris vittata* L., *Selaginella adunca* A. Br. ex Hieron, *Selaginella chrysocaulos* Hook. &Grev., *Cheilanthes bicolour* (Roxb.) Grif. ex Fraser Jenkins, *Ampelopteris prolifera* (Retz.) Copel. and *Christella dentata* (Forsk.) Brownsey et Jermy. The minimum and maximum tracheid lengths are 0.32 mm in the roots of *Selaginella adunca* and 1.69 mm in the stipe of *Adiantum lunulatum*. The minimum tracheid width is 0.01 mm in different parts of most species and maximum width is 0.03 mm in *Pteris vittata*. The minimum and maximum length/breadth ratio for tracheids are 21 in the rhizome of *Adiantum incisum* and *Cheilanthes bicolor* and 169 in the stipe of *Adiantum lunulatum*. Tracheids length-breadth ratios and other characteristics are elaborated.

489. **Seth, M.K. & Kumar, S. 2005.** "Tracheary elements in pteridophytes of Bilaspur (Himachal Pradesh). Part–II: Length, breadth and length/breadth ratio of vessels". *Indian Fern J.* 22: 137–145.

Abstract: Length, breadth and length/breadth ratio of vessels of 13 species of pteridophytes of Bilaspur district of Himachal Pradesh have been studied. Detailed observations concern *Adiantum capillus-veneris* L., *A. incisum* Forsk., *A. lunulatum* Burm.f., *Asplenium dalhousiae* Hook., *Hypodematium crenatum* (Forsk.) Kuhn ex V. Deck., *Equisetum arvense* L., *Marsilea minuta* L., *Pteris vittata* L., *Selaginella adunca* A. Br. ex Hieron, *Selaginella chrysocaulos* Hook. &Grev., *Cheilanthes bicolour* (Roxb.) Grif. ex Fraser Jenkins, *Ampelopteris prolifera* (Retz.) Copel., and *Christella dentata* (Forsk.) Brownsey et Jermy. Vessels have been observed in various plant parts of the species studied presently. Branched vessels have been observed in the stipe and branched rachis portion of *Cheilanthes bicolor*. The minimum vessel length is 0.03 mm in the rhizome of *Cheilanthes bicolor* and maximum 0.59 mm in the pinna rachis of *Adiantum capillus-veneris*. The minimum vessel width is 0.03 mm in the root of *Cheilanthes bicolor* and in the pinna rachis of *Adiantum capillus-veneris* and the maximum width is 0.12

mm in the rhizome of *Cheilanthes bicolor*. The minimum and maximum length/breadth ratios for vessels are 0.3 in the rhizome of *Cheilanthes bicolor* and 19.6 in the pinna rachis of *Adiantum capillus-veneris*. The presence and significance of vessels in plants is discussed.

490. **Seth, M.K. & Kumar, S. 2007.** Pteridophytic flora of Bilaspur, Himachal Pradesh. Part 1: General account of Bilaspur district and 13 most common pteridophytes. In: Prasher, I.B. & Ahluwalia, A.S. (Eds.), *Achievements and Prospects in Pteridophytes*. Bishen Singh Mahendra Pal Singh, Dehra Dun. Pp. 19–45.

491. **Seth, M.K., Kumari, A. & Khullar, S.P. 2000.** "Common pteridophytes of Shimla (Himachal Pradesh) Part II: Athyriaceae". *Bull. Bot. Surv. India* 42(1-4): 41–64.

Abstract: The general characters of the family, genus and species alongwith their keys for identification have been presented. Six species of Athyrium, namely *Athyrium flabellulatum, A. foliolosum, A. pectinatum, A. rupicola, A. schimperi, A. setiferum* and *A. strigillosum*; two species of *Deparia*, namely *Deparia boryana* and *D. japonica* and two species of *Diplazium*, namely *Diplazium esculentum* and *D. maximum* of family Athyriaceae have been dealt with.

492. **Seth, M.K., Seth, A. & Negi, H.C. 2004.** "Pteridophytic flora of Kinnaur, Himachal Pradesh. Part I: A general account of Kinnaur district and eight species belonging to suborder Pteridineae of order Pteridales". *Indian Fern J.* 21: 45–62.

Abstract: In the present study, information of district Kinnaur along with 8 most common ferns namely *Adiantum capillus-veneris, Adiantum venustum, Pellaea nitidula, Onychium contiguum, Pteridium aquilinum, Pteris cretica, Pteris vittata* and *Hypolepis punctata* is provided. Information on the habitat and economic importance of these plants is also briefly provided.

493. **Seth, M.K., Seth, A. & Negi, H.C. 2004.** "Pteridophytic flora of Kinnaur, Himachal Pradesh. Part III: Nine common pteridophytes belonging to families Dennstaedtiaceae, Thelypteridaceae and Aspleniaceae". *Phytotaxonomy* 4: 25–35.

Abstract: In the absence of sufficient information on petridophytic flora of district Kinnaur (Himachal Pradesh), the work on collection and identification of pteridophytes has been initiated in the Department of Biosicences, Himachal Pradesh University, Shimla. In part III of this series, nine common ferns of district Kinnaur have been described: *Emodiopteris appendiculata, Christella dentata, Pseudophegopteris levingii, Pseudophegopteris pyrrhorachis, Glaphyropteridopsis erubescens, Asplenium adiantum-nigrum, Asplenium ceterarch* subsp. *ceterach, Asplenium dalhousiae* and *Asplenium trichomanes*. The habitat and economic importance of these plants are also briefly described.

494. **Seth, M.K., Seth, A. & Negi, H.C. 2004.** "Pteridophytic flora of Kinnaur, Himachal Pradesh. Part II: 13 common pteridophytes belonging to families Hypodematiaceae, Athyriaceae, Dryopteridaceae, Selaginellaceae and Equisetaceae". *Indian Fern J.* 21: 63–80.

Abstract: In the present account 13 common ferns and fern allies of district Kinnaur have been described. These are *Hypodematium crenatum, Athyrium mackinnoniorum, Athyrium schimperi, Athyrium strigillosum, Cystopteris fragilis, Deparia allantodioides, Diplazium maximum, Dryopteris caroli-hopei, Polistichum bakerianum, Polystichum discretum, Equisetum diffusum, Selaginella adunca* and *Selaginella chrysocaulos*. The habitat and economic importance of these plants are briefly described.

495. **Seth, M.K., Kumari, A., Bhandari, A. & Khullar, S.P. 2002.** "Common pteridophytes of Shimla (Himachal Pradesh), N.W. Himalaya III: Families Polypodiaceae, Loxogrammaceae, Cryptogrammaceae, Sinopteridaceae and Osmundaceae". *Indian Fern J.* 19: 10–33.

Abstract: The paper presents systematic account of 2 species of *Polypodiodes* (*P. amoena* and *P. lachnopus*), 5 species of *Lepisorus* (*L. contortus, L. kashyapii, L. morrisonensis, L. pseudonudus* and *P. sesquipedalis*) of family Polypodiaceae. One species of *Loxogramme* (*L. involuta*) of family Loxogrammaceae. One species of *Onychium* (*O. Contiguum*) of the family Cryptogrammaceae, 2 species of *Cheilanthes* (*C. albomarginata* and *C. dalhousiae*) of family Sinopteridaceae and one species of *Osmunda* (*O. Regalis*) of family Osmundaceae has been presented. General characters at family, genus and species level alongwith their keys for identification have been provided. The paper is illustrated with field photographs.

496. **Seth, M.K., Kumari, A., Bhandari, A. & Khullar, S.P. 2002.** "Common pteridophytes of Shimla (Himachal Pradesh), N.W. Hiamalaya IV: Dryopteridaceae, Hypodematiaceae, Thelypteridaceae, Blechnaceae and Pteridaceae". *Indian Fern J.* 19: 55–81.

Abstract: Presently taxonomic and systematic account of 11 common fern species of Shimla, N.W. Hiamalayas are given. These include 3 species of *Dryopteris* (*D. Caroili-hopei, D. Chrysocoma* and *D. Juxtaposita*) and 2 species of *Polystichum* (*P. discretum* and *P. squarrosum*) of family Dryopteridaceae; one species of *Hypodematium* (*H. crenatum*) of family Hypodematiaceae; one species of *Christella* (C. *appendiculata*); one species of *Glaphyropteridopsis* (*G. erubescens*) of family Thelypteridaceae; one species of *Woodwardtia* (*W. unigemmata*) of family Blechnaceae and 2 species of *Pteris* (*P. cretica* and *P. pseudoquadriaurita*) of family Pteridaceae. General characters of the family, genus and species and the keys for identification have also been provided. Of additional interest are their photographs facilitating easy identification in the field.

497. **Seth, M.K., Kumari, A., Bhandari, A. & Khullar, S.P. 2004.** "Common pteridophytes of Shimla (Himachal Pradesh). Part I. Adiantaceae, Hemionitidaceae, Davalliaceae and Aspleniaceae". *J. Econ. Taxon. Bot.* 28(3): 635–652.

Abstract: In this paper coloured photographs of 3 species of *Adiantum,* namely *A. capilles-veneris, A. edgeworthii* and *A. venustum* of family Adiantaceae; one species each of *Anogramma leptophylla* and *Gymnopteris vestita* of family Hemionitidaceae; two species of *Araiostegia*, namely, *A. pseudocystopteris* and *A. pulchra* of family Davalliaceae and four species of *Asplenium,* namely *A. dalhousie, A indicum, A. laciniatum* and *A. trichomanes* of family Aspleniaceae have been presented. The general characters of the family, genus and species are described. Keys for the identification of genus and species have also been presented.

498. **Sharma, Anurita. 2014.** "Ferns of the Aabshar Forest area (Kandaghat, dist. Solan), Himachal Pradesh, West Himalaya". *Indian Fern J.* 31: 143–151.

Abstract: The Aabshar forest area near Kandaghat, dist. Solan, Himachal Pradesh (West Himalaya) was visited several times for collection of ferns since there is no comprehensive account of the ferns of this area. The forest here is basically composed of Oak (*Quercus leucotrichophora* A. Camus). Forty two fern species have been collected. These are listed alphabetically in the list provided.

499. **Sharma, Anurita. 2015.** "Electron micrographs of five fern species from Mt. Karol (dist. Solan), Himachal Pradesh". *Indian Fern J.* 32: 186–192.

Abstract: Electron micrographs of five species of ferns collected from Mt. Karol area in Solan dist. are being given. These are: *Adiantum capillus-veneris* L., *Adiantum edgeworthii* Hook., *Onychium cryptogrammoides* Christ, *Pteris aspericaulis* Wall. ex J. Agardh (syn. *P. pseudoquadriaurita* Khullar) and *Pteris vittata* L. subsp. *vittata.*

500. **Sharma, J. 1985.** "*Strobilomyces mollis* Corner– A new record for India". *Bull. Bot. Surv. India* 27(1-4): 236–237.

Abstract: *Strobilomyces mollis* Corner has been described and illustrated from Himachal Pradesh.

501. **Sharma, J.R. 1985.** "*Gyroporus castaneus* (Fries) Quel.– A new record for India". *Indian J. Forest.* 8(1): 70–71.

Abstract: *Gyroporus castaneus* (Fries) Quel. of the family Boletaceae has been reported for the first time for India from Toradevi, Simla, Himachal Pradesh.

502. **Sharma, J.R. 1985.** "Studies on Polyporaceae of Himachal Pradesh". *J. Econ. Taxon. Bot.* 7(1): 95–101.

Abstract: Ninety two species of Polyporaceae in the order Aphyllophorales are reported from Himachal Pradesh. Data on substratum relationships and collection numbers are given.

503. **Sharma, J.R. & Mishra, Deepa. 2011.** "Diversity of wood-rotting fungi in temperate Himalayas". *Phytotaxonomy* 11: 103–119.

Abstract: Species of wood-rotting fungi of the order Aphyllophorales form an integral part of the temperate forested Himalayan ecosystems (states of Jammu & Kashmir, Himachal Pradesh and Garhwal and Kumaon regions of Uttarakhand) and play the primary role of formation of forest soils by decomposition of substrates. There exists a high diversity in species composition and richness, host preferences and type of wood rots caused by them. The essential but a mammoth task of studying their rich diversity has been limited by taxonomic and logistic difficulties in collecting and defining fungal species. The various difficulties like seasonal fluctuations, succession of substrates and other considerations have led to problems in assessing and documenting their diversity. Dynamics during decomposition of substrate and mechanism of its decay are emphasized. The various threats to the wood-rotting fungi as a whole and the conservation measures required to be under taken are also evaluated.

504. **Sharma, J.R., Pandey, K.N. & Bisht, D. 2007.** "Two new records of the genus *Bovista* Pers. (Gasteromycetes) from India". *Bull. Bot. Surv. India* 49(1-4): 225–230.

Abstract: *Bovista oblongispora* (Lloyd) Bottomley and *B. cunninghamii* Kreisel has been recorded for the first time for India from Himachal Pradesh and Uttaranchal, respectively.

505. **Sharma, J.R., Das, Kanad & Bisht, D. 2007.** "Macrofungal communities in temperate Himalayan forests". *Phytotaxonomy* 7: 13–20.

Abstract: Macrofungal communities vary in time and space in temperate Himalayan forests. Only 1-2% of them belonging to wood-decomposers grow in the canopy. The canopy fungi mostly belong to those fungi that grow in the understorey. Woody substrate on the forest floor and the understorey support 40-45% of the macrofungal flora, mostly belonging to the Aphyllophoraceous group. The species of Agaricales, Boletales, Russulales and sequestrate fungi dominate ectomycorrhizae- forming fungi and account for about 50% of the mycoflora. Decomposers of the leaf litter on the floor show some stratification with some species colonizing fresh leaf litter while others preferring the decomposed litter. Less than 5% of the total macrofungal flora account for species growing in specific habitats, like mycophilous, corpophilous, humicolous soil, moss decomposers, parasitic, post-putrefaction fungi. The specificity to particular host substrates also contributes to spatial heterogeneity in fungal communities.

506. **Sharma, M.P. & Sharma, A. 1991.** Lichens of Mussoorie and Shimla hills with notes on Saxicolous taxa of Lahaul and Spiti. In: Khullar, S.P. & Sharma, M.P. (Eds.), *Himalayan Botanical Researches*. M/S Ashish Publishing House, Delhi, pp. 265–274.

507. **Sharma, M.P., Khullar, S.P. & Rana, K. 2002.** "Lichens of Sangla Valley (H.P.)". *Indian J. Appl. & Pure Biol.* 17(2): 120–126.

508. **Sharma, M.P., Khullar, S.P. & Rana, K. 2002.** Lichen floristics from Sirmaur district. In: Vij, S.P., Kondo, K., Sharma, M.L. & Gupta, A. (Eds.), *Plant Genetic Diversity, Exploration, Evaluation and Conservation*. Affliated East-West Press, New Delhi, pp. 15–21.

509. **Sharma, M.P., Thind, K.S. & Rawla, G.S. 1980.** "A new species of *Phialea* from India". *J. Indian Bot. Soc.* 59: 336–337.

Abstract: A new species, *Phialea bambusae* Sharma, Thind & Rawla is described and illustrated from Himachal Pradesh and Uttar Pradesh, North-Western Himalaya, India.

510. **Sharma, P. & Samant, S.S. 2016.** "Diversity of pteridophytes in the surroundings and dam submergence areas of hydroelectric projects in Kullu district of Himachal Pradesh, Indian Himalaya". *Forestry Ideas* 22(2): 127–136.

Abstract: The Himalayan Region in India is very unique and globally known for its unique topography, large altitudinal range, climate and diverse habitats. The pteridophytes are important from evolutionary point of view, as they show the evolution of vascular system and reflect the emergence of seed habitat in the plants. Due to rich biodiversity of Himachal Pradesh, the pteridophytic flora is also interesting in its diversity and distribution, however, little is worked out on the economic aspects of these plants. Therefore, present communication pertains to the diversity of ferns in the surroundings and dam submergence areas of three hydroelectric projects of Himachal Pradesh. Overall, 63 species of pteridophytes, belonging to 15 families and 29 genera, were recorded. Maximum species (56 spp.) were found in forest habitat, followed by riverine/watercourse (48 spp.), shadymoist (42 spp.), bouldary (21 spp.), dry (17 spp.), degraded (12 spp.), submergence area (12 spp.), landslide and near crop field/orchards (4 spp. each), waste place/road side (1 sp.). Large scale deforestation and increasing anthropogenic activities have caused elimination of the habitats, which is posing a serious threat to the pteridophytes of the Himalayan region. Several conservation measures and management programmes have been taken up in various regions for the angiosperms, but very little attention has been given to the conservation of pteridophytes. Therefore, it is important to formulate and implement a detailed scientific study with aim of conservation of pteridophytes to ensure their long term conservation.

511. **Sharma, R.K. & Sachan, S.N. 1994.** "New host of rust fungi from Himachal Pradesh". *Advances Pl. Sci.* 7(1): 154–158.

Abstract: The rust fungi reported in this paper were collected by the authors from Bilaspur, Mandi and Hamirpur districts of Himachal Pradesh. Nine species of *Puccinia*,

among them two are new host records from India and seven are being recorded for the first time from Himachal Pradesh.

512. **Sharma, S. & Khullar, S.P. 2004.** "Fern hybrids from Kangra Himalaya". *J. Indian Bot. Soc.* 83: 54–60.

513. **Sharma, S., Gautam, Ajay Kumar & Bhadauria, R. 2009.** "Some important supplementary food plants and wild edible fungi of Upper Hilly region of district Shimla (Himachal Pradesh), India". *Ethnobot. Leafl.* 13: 1020–1028.

Abstract: An ethnobotanical survey of upper hilly region of Shimla was carried out in 2008 to enumerate some of the important plants used as supplementary food among the people of this area. Presence of twenty four plant species belonging to 20 genera and 14 families was documented under the present study along with 11 macrofungi belonging to 6 genera and 6 families. Generally fruits (51 %) and leaves (33%) of these plants were found to be used as supplementary food. Use of seeds, buds, stem and petiole of few plants was also observed. All the important plants and macrofungi used as supplementary food by the people of the locality are grouped on the basis of their mode of use.

514. **Sharma, S.K. & Choyal, R.R. 2011.** "Distrbution of moss in the topography of Kangra district (H.P.)". *Indian J. Fundamental & Appl. Life Sci.* 1(2): 154–156.

Abstract: The present study was carried out during March 2008 to September 2010. Regular and periodical visits to different sites were made during this period. Nine species of mosses i.e., *Agrobryidium filamentosum, Barbula convoluta, Bryum argenteum, Bryum biocolor, Bryum cellular, Fimbraria dilatata, Funaria hygrometrica, Pogonatum microstomum, Polytrichum densifolium* are reported and studied here. Moss, such as *Funaria hygrometrica* showed maximum frequency percentage.

515. **Shukla, A., Sharma, S.K., Verma, S. & Shylla, B. 2017.** "A new record on algal leaf spot of Quince from Himachal Pradesh, India". *Int. J. Curr. Microbiol. Appl. Sci.* 6(9): 3103–3106.

Abstract: Quince (*Cydonia oblonga*) is a hardy tree and very less susceptible to diseases. Therefore, used as a dwarfing rootstock for pear, depending on the scion desired and characteristics of the production area. Algal leaf spot is a foliar disease most commonly seen in warm humid climate or in greenhouse conditions. The spots were circular or blotchy in shape, 1-5 mm in size and were somewhat raised from the plant surface. The edges of the spots were wavy or feathered. They varied in colour from a crusty grey-green to yellowish orange. The severity of the disease was rated 15-20 per cent on 0-5 scale. Based on morphological characteristics viz., sporangiophore, head cell and sporangiate laterals (suffultory cell and sporangium) the algal leaf spot of quince was found to be associated with *Cephaleuros virescens.*

The measurement of sporangiophores varied from 305.3-670.4 x 11.1-19.2 µm (Av. 472.3 x 14.5 µm), sporangia from 22.4-32.8 x 16.8-23.07 µm (Av. 27.6 x 19.9 µm) and that of head cell from 30.2-57.4 x 29.4-56.2 µm (Av. 43.6 x 42.5 µm). The number of septa of sporangiophores varied from 4-8. This is the first report on the occurrence of algal leaf spot of quince caused by *Cephaleuros virescens* from Himachal Pradesh, India.

516. **Singh, A.P. 2007**. *Resupinate Aphyllophoraceous Fungi associated with some tree species of Himachal Pradesh and Punjab*. Ph.D. Thesis. Punjabi University, Patiala. (Unpublished).

517. **Singh, P.N., Gaikwad, S.B. & Singh, S.K. 2007.** "Two interesting and undescribed species of *Septoria* from India". *J. Econ. Taxon. Bot.* 31(2): 543–546.

Abstract: This paper deals with two undescribed taxa of *Septoria* viz., *S. indica* sp. nov. causing distinct leaf spot on living leaves of *Geranium* sp. (Geraniaceae) in Shimla, Himachal Pradesh and *S. asteraxearum* sp. nov. causing distinct leaf spot on living leaves of *Tagetes* sp. (Asteraceae) in Koyana Wildlife Sanctuary, Maharashtra, respectively.

518. **Singh, Sarnam, Singh, Surendra, Singh, D.K., Uniyal, B.P. & Singh, T.P. 2003.** "Some little known ferns from Lahaul-Spiti district, Himachal Pradesh". *Indian J. Forest.* 26(4): 406–408.

Abstract: Lahaul-Spiti district of Himachal Pradesh is a cold desert. Ferns occur less in dry climate, and are known to flourish in moist humid conditions. However, shaded slopes and moist rocks near water source provide good habitat for some species. Occurrence of nine species of fern are reported here. These species are *Athyrium attenuatum* (Wallich ex C.B. Clarke) Tagawa, *A. flabellatum* (C.B. Clarke) Tardeau-Blot., *A. micropterum* Fraser-Jenkins, *A. rupicola* (Edgew. ex Hope) C. Chr., *Cystopteris dickeana* Sim, *Gymnocarpium fedtschenkoanum* Pojark, *Dryopteris yigongensis* Ching, *Phegopteris connectilis* (Michx.) Watt and *Pseudophegopteris levingei* (C.B. Clarke) Ching.

519. **Singh, S.K. & Singh, D.K. 2003.** "*Heteroscyphus orbiculatus* Srivast. *et* Srivast.: New to Himalayan bryoflora". *Indian J. Forest.* 26(3): 317–319.

Abstract: *Heteroscyphus orbiculatus* Srivast. *et* Srivast., so far known from Kodaikanal in Western Ghats, is described fir the first time from Great Himalayan national Park, Kullu, Himachal Pradesh in North-West Himalaya. This species can be easily recognised from other species of the genus in the region in having light green to brownish green plant; undifferentiated, thin-walled cells of stem; usually orbicular leaves, broadest in middle with dentate or entire apex; leaf cells with small tri-radiate trigones; deeply bilobed underleaves with 1-3 cells long tooth on one or both lateral margins. Distributional pattern of the west Himalayan taxa of the genus has been discussed.

520. **Singh, S.K. & Singh, D.K. 2003.** "Contribution to the bryoflora of Great Himalayan National Park, Kullu, Himachal Pradesh, India– II. Hepaticae". *Phytotaxonomy* 3: 35–52.

Abstract: The paper deals with morpho-taxonomical studies on twelve species of liverworts, viz. *Radula lindbergiana* Gott., *R. obscura* Mitt. (Radulaceae), *Porella madagascariensis* (Nees & Mont.) Trev. (Porellaceae), *Frullania squarrosa* f. *ericoides* (Nees) Verd. (Jubulaceae), *Cyathodium tuberosum* Kash., *Targionia indica* Udar & Gupta (Targioniaceae), *Cryptomitrium himalayense* Kash., *Mannia fragrens* (Balbis) Frye & Clar, *M. indica* (Steph.) Kachroo, *Plagiochasma appendiculatum* L. *et* L., *P. articulatum* Kash. and *Reboulia hemisphaerica* Raddi (Rebouliaceae). All the species included in this paper are recorded for the first time from this National Park.

521. **Singh, S.K. & Singh, D.K. 2006.** "*Plagiochila ovalifolia* Mitt., a new record for Indian bryoflora". *J. Non-Timber Forest Prod.* 13(1): 69–72.

Abstract: *Plagiochila ovalifolia* Mitt., has been recorded for the first time in Indian bryoflora from Great Himalayan National Park, Kullu district, Himachal Pradesh. A detailed illustrated account of the species has been provided to facilitate its easy identification.

522. **Singh, S.K. & Singh, D.K. 2005.** "*Lopholejeunea sikkimensis* var. *tenuicostata* (Hepaticae: Lejeuneaceae) a new variety from Great Himalayan National Park, Himachal Pradesh, India". *Bull. Bot. Surv. India* 47(1-4): 189–192.

Abstract: Anew variety of *Lopholejeunea sikkimensis* viz., *L. sikkimensis* var. *tenuicostata* allied to *L. sikkimensis* var. *sikkimensis* has been described and illustrated from Sainj valley- on way from Bah-Lapah, Great Himalayan National Park (Kullu), Himachal Pradesh.

523. **Singh, S.K. & Singh, D.K. 2007.** "Contribution to the bryoflora of Great Himalayan National Park, Kullu, Himachal Pradesh V: Genus *Plagiochila* (Dumort.) Dumort. (Plagiochilaceae)". *Indian J. Forest.* 30(1): 101–112.

Abstract: Twelve species of the genus *Plagiochila* (Dumort.) Dumort., have been described and illustrated from Great Himalayan national park and its environs in Kullu district, Himachal Pradesh. Of these, *P. elegans* and *P. richteri* are extremely rare in the study area, whereas *P. duthiana, P. mundaliensis, P. nepalensis, P. parviflora* and *P. sciophila* are quite common. The others show restricted distribution. The phytoclimatic conditions in the Sainj valley of the Park appear to be more congenial for the growth of the genus.

524. **Singh, S.K. & Singh, D.K. 2010.** "A catalogue of the liverworts and hornworts of Himachal Pradesh, India". *Archives Bryol.* 61: 1–13.

Abstract: This catalogue includes a total of 150 valid names from the State of Himachal Pradesh, India, of them 140 taxa (128 species, 6 subspecies, 5 varieties and 1 forma)

belonging to liverworts and 10 species to hornworts, based on literature and authors' own survey and documentation of the two groups from the State since 2001. Fifty four taxa (including three new species and one new variety) are recently added by the authors alone to the area. Literature reference for each species and synonyms from the area has been given with their correct name in the catalogue.

525. **Singh, U.B. & Sharma, C. 2014.** "Microalgal diversity of Sheer Khad (stream): A tributary of Sutlej river, Himachal Pradesh, India". *J. Res. Pl. Sci.* 3(1): 235–241.

Abstract: Sheer Khad (stream), an unexplored tributary of river Sutlej, located in North-Western Himalayas, Himachal Pradesh (India) was studied on the basis of algal diversity during a survey in August 2009. The climate of selected sites varied according to altitude and collectively represented temperate climate. Nineteen microalgal taxa belonging to Cyanophyta (8 taxa), Chlorophyta (7 taxa), and Bacillariophyta (4 taxa) were found present during the present study. Present study provides necessary baseline data on Sheer Khad in relation to microalgal diversity and would help other researchers.

526. **Singh, V.K., Verma, D., Nayaka, S., Toppo, K. & Lavania, S. 2018.** "Cyanobacterial flora from thermal springs of the Kullu district, Himachal Pradesh, India". *J. Indian Bot. Soc.* 97(3&4): 166–172.

Abstract: The present paper reports 40 fresh water cyanobacterial taxa grouped under 5 order, 12 families and 19 genera from five thermal springs (Vashisht, Kalath, Kasol, Manikaran and Khirganga) of Himachal Pradesh, India. Water temperature of these thermal springs at the point of sampling was quite high ranged from 39^0 C to 92^0 C and pH ranged from 6.4 to 6.9. Six cyanobacterial species viz., *Geitlerinema exile, Geitlerinema splendidum, Leptolynbgya boryana, Leptolynbgya laminosa, Leptolynbgya margaretheana* and *Planktolyngbya contorta* have been reported first time from these thermal springs. Sample collected from these thermal springs are grown in BG-11 medium in laboratory at normal temperature 27^0 C. Some taxa like *Oscillatoria limosa, Oscillatoria princeps, Chroococcus limneticus, Chroococcus turgidus* and *Lyngbya* sp. have adopted to laboratory conditionand grown well. These thermal spring cyanobacterial isolates can be used for ecological, physiological and bio-prospection oriented research.

527. **Sohi, H.S., Kumar, S. & Seth, P.K. 1965.** "Some interesting fleshy fungi from Himachal Pradesh–I". *J. Indian Bot. Soc.* 44(1-4): 69–74.

Abstract: This paper deals with 10 species belonging to Pezizales (Section Operculates). Four species, viz., *Morchella hydrida* (Sow.) Pers., *Elvela sphaerospora* Peck, *E. mitra* L. and *Peziza sylvestris* (Boud.) Sacc. and Trott. Are new records for India while other six species are being recorded for the first time in Himachal Pradesh.

Morchella hybrida, M. angusticeps, M. conica, M. esculenta, Elvela mitra and *E. crispa* are edible.

528. **Srivastava, Rahul, Upreti, D.K. & Yadav, V. 2006.** "Lichen flora of Lahaul & Spiti district, Himachal Pradesh". *Phytotaxonomy* 6: 61–68.

Abstract: The lichen flora of Lahaul & Spiti district of Himachal Pradesh is enumerated. Of the 600 specimens collected from 22 localities of the area. 81 species of lichens belonging to 37 genera within 25 families are reported. Chhatru area in Lahaul valley shows maximum lichen diversity represented by 29 species, while most of the localities of Spiti valley have poor diversity of lichens represented by 5-7 species in each locality. The various strategies adopted by the lichens to grow in cold deserts are also discussed together with the factors determining the type of lichen growth in the area.

529. **Srivastava, Rahul, Yadav, V., Upreti, D.K. & Nayaka, S. 2004.** "An enumeration of Lichens from Shimla district, Himachal Pradesh". *Geophytology* 33(1&2): 29–34.

530. **Srivastava, Rahul, Yadav, V., Upreti, D.K. & Sharma, Neeta. 2004.** "Lichen flora of Bilaspur, Hamirpur & Una districts of Himachal Pradesh, India". *Phytotaxonomy* 4: 11–18.

Abstract: The paper deals with an enumeration of 70 species of lichens belonging to 36 genera and 23 families from Bilaspur, Hamirpur & Una districts in foothills of Himachal Pradesh. Out of the total species listed from the area, 9 taxa are new addition to the earlier known lichen flora of the state. The factors responsible for poor to scarce growth of lichens are discussed.

531. **Srivastava, S.C. & Srivastava, Anshu. 1993.** "A remarkable *Scapania* (Scapaniaceae) from Manali (Himachal Pradesh: Western Himalaya)". *J. Indian Bot. Soc.* 72(3-4): 237–240.

Abstract: Interesting specimens partly answering to *Scapania* (Dum.) Dum. and partly to *Diplophyllum* (Dum.) Dum. (a close relative of the former) have been described as *S. udarii* sp. nov. from Manali, Himachal Pradesh, Western Himalaya. The vegetative features such as the robust nature of plants, stem anatomy (of 3-4 cell layered thick cortex), slight divergence of leaf-lobes, broadly ovate to obovate lobes, decurrence of leaves and keel of the lobes outward to stem appear to resemble *Scapania*. But triangular to polyangular, 1-2 celled gemmae (ovoid in *Scapania*) correspond with the genus *Diplophyllum*. Various features of the plants have been critically evaluated and discussed.

532. **Srivastava, S.K. & Gupta, R.K. 2004.** "Studies on the algal plant diversity of Pong Dam wetland". *Indian J. Forest.* 27(1): 103–111.

Abstract: the paper present a preliminary account of the vegetation pattern and floristic diversity in the catchment area of the Pong Dam wetland in Himachal Pradesh.

Brief description of 41 species of algae with line drawings of *ca* 22 species have been provided, which include one new record for Indian territory. Some significant observations related to the habitat and their ecology has been made, with a note on their status of occurrence and distribution in India.

533. **Srivastava, S.K. & Gupta, R.K. 2009.** "Contribution to the algal flora of Renuka lake wetland, Himachal Pradesh". *Indian J. Forest.* 32(1): 107–112.

Abstract: The paper presents an enumeration of 35 algal species belonging to 22 genera under 12 families from four classes are recorded from Renuka lake, wetland in Himachal Pradesh. This study has revealed the rare and dominant algal taxa in the lake. A earlier report on the algal flora in the lake has also been discussed.

534. **Suseela, M.R. & Toppo, Kiran. 2009.** "Enumeration of fresh water algal flora of Chandpur river of Palampur, Himachal Pradesh, India". *J. Econ. Taxon. Bot.* 33(4): 966–972.

Abstract: The present paper enumerates 47 taxa of fresh water algae of Chandpur river of Palampur, Himachal Pradesh in North India. Of these, 9 were blue-green algae (Cyanophyceae), 34 were green algae (Chlorophyceae) and 5 were diatoms (Bacillariophyceae). Chlorophycean algae were the dominant algae in this river. All taxa were reported for the first time from Chandpur river.

535. **Thakur, M. & Chander, H. 2018.** "Common foliose macrolichens in Sikandar Dhar, North-Western Himalaya". *CPUH Res. J.* 3(2): 179–186.

Abstract: Floristi studies have been initiated to explore diversity of macrolichens in and around Sikander Dhar. It is situated in Shivalik hills zone of North Western Himalaya and is located in district Mandi of Himachal Pradesh (India). During the present study, a total of seventeen species of foliose macrolichens (*Candelaria concolor* (Dicks.) Arnold, *Canoparmelia pustulescens* (Kurok.) Elix, Dermatocarpon vellereum Zschacke, Heterodermia pseudospeciosa (Kurok.) W.L. Culb, *Hyperphyscia syncolla* (Tuck. ex Nyl.) Kalb, *Parmotrema austrosinense* (Zahlbr.) Hale, *P. ravum* (Krog & Swinscow) Sérus, *Parmotrema tinctorum* (Despr. ex Nyl.) Hale, *Phaeophyscia ciliata* (Hoffm.) Moberg, *P. hispidula* (Ach.) Essl, *Physcia crispa* Nyl, *P. integrata* Nyl, *Punctelia neutralis* (Hale) Krog, *P. subrudecta* (Nyl.) Krog, *Pyxine asiatica* Vain, *P. isidiophora* (Müll. Arg.) Imshaug and *P. subcinerea* Stirt) have been recorded for the first time from the study area (Sikander Dhar, Himachal Pradesh).

536. **Thakur, M. & Chander, H. 2018.** "Bio-indicator Lichens of Sikandra Hills of North-West Himalaya". *Asian J. Adv. Basic Sci.* 6(2): 35–37.

Abstract: During the lichen floristic studies, three hundred specimens of lichens were collected from Sikandra hill, which is situated in Shivalik zone of North West Himalaya. These specimens were then investigated morphochemo-taxonomically and thirty

species of lichens have been identified. Out of these, ten species of lichens (viz. *Candelaria concolor* (Dicks.) Arnold, *Heterodermia pseudospeciosa* (Kurok.) W.L. Culb, *Lecanora chlarotera* Nyl, *Parmotrema praesorediosum* (Nyl.) Hale, *Parmotrema tinctorum* (Despr. ex Nyl.) Hale, *Phaeophyscia hispidula* (Ach.) Essl, *Physcia stellaris* (L.) Nyl., *Punctelia subrudecta* (Nyl.) Krog, *Pyxine subcinerea* Stirt) act as bio-indicator. *Candelaria concoloris* a nitrophile and act as indicator of nitrogen pollution, whereas, *Punctelia subrudecta* is nitrogen tolerant. *Heterodermia pseudospeciosa* belong to physcioid lichen community and is toxi-tolerant species. The other seven lichen speciesact as bio-indicator of heavy metal air pollutants (iron, chromium, copper, zinc, lead and nickel. These potential bio-indicator lichen species can be used for monitoring of environmental quality in the study area.

537. **Thakur, M. & Chander, H. 2018.** "Ethnolichenological notes on Lichens of Sikandra Dhar region of North-West Himalaya". *Asian J. Adv. Basic Sci.* 6(2): 38–41.

Abstract: Presence of a wide range of secondary metabolites in lichen thallus is variously utilized as medicine, food, fodder, dye and spices. During the lichen floristic studies undertaken during January to September in 2018, three hundred specimens of lichens were collected from Sikandra dhar region of district Mandi (Himachal Pradesh). These specimens were then investigated morpho-chemo-taxonomically and identified. Out of these, seven species of lichens viz. *Aspicilia calcarea* (L.) Körb., *Cladonia coniocraea* (Flörke) Spreng., *Dermatocarpon vellereum* Zschacke, *Lecanora chlarotera* Nyl., *Parmotrema austrosinense* (Zahlbr.) Hale, *Parmotrema tinctorum* (Despr. ex Nyl.) Hale and *Punctelia borreri* (Turner) Krog are of ethnolichenological importance. *Aspicilia calcarea* is a source of nutrition for mites, snails and caterpillars. *Cladonia coniocraea* is a good source of carbohydrates and mixed with flour. *Dermatocarpon vellereum* has antimicrobial properties against human pathogens viz. *Staphylococcus aureus*, *S. faecalis* and *Pseudomonas aeruginosa*. *Parmotrema tinctorum* has a good food value as it contains high protein content (14%) along with amino acids, ergosterol, iron and calcium. It is also a source of brown dye for textile. *Parmotrema austrosinense* is antimicrobial and has antioxidant and anti-phytopathogenic effect. *Punctelia borreri* is medicinal and used to cure blurred vision, bleeding from uterus, bleeding from external injuries, sores, swelling, chronic dermatitis and localized swelling.

538. **Thakur, M. & Chander, H. 2018.** "An enumeration of lichenized fungi from Sikandar Dhar region of district Mandi, Himachal Pradesh". *J. Biol. Chem. Chron.* 4(2): 104–116.

Abstract: Floristic studies have been initiated to explore diversity of lichenized fungi in Sikandra dhar region of district Mandi, Himachal Pradesh (India). Sikandra dhar region is situated in Shivalik hills zone of North-West Himalaya. A total of three hundred specimens of lichenized fungi were collected from Sikandra dhar region.

During the morpho-chemotaxonomic investigations, a total of twenty five species of lichens (*Aspicilia calcarea* (L.) Körb., *Brianaria bauschiana* (Körb.) S. Ekman & M. Svenss., *Candelaria concolor* (Dicks.) Arnold, *Canoparmelia pustulescens* (Kurok.) Elix, *Chrysothrix candelaris* (L.) J.R. Laundon, C. *chlorina* (Ach.) J.R. Laundon, *Cladonia coniocraea* (Flörke) Spreng, *Dermatocarpon vellereum* Zschacke, *Heterodermia pseudospeciosa* (Kurok.) W.L. Culb, *Hyperphyscia syncolla* (Tuck. ex Nyl.) Kalb, *Hypotrachyna masonhalei* Patw. & Prabhu, *Lecanora chlarotera* Nyl., *Parmotrema austrosinense* (Zahlbr.) Hale, *P. ravum* (Krog & Swinscow) Sérus, *P. tinctorum* (Despr. ex Nyl.) Hale, *Phaeophyscia ciliata* (Hoffm.) Moberg, *P. hispidula* (Ach.) Essl, *Physcia crispa* Nyl, *P. integrata* Nyl, *P. semipinnata* (Leers ex J.F. Gmel.) Moberg, *Punctelia neutralis* (Hale) Krog, *P. subrudecta* (Nyl.) Krog, *Pyxine asiatica* Vain, *P. isidiophora* (Müll. Arg.) Imshaug and *P. subcinerea* Stirt), belonging to fifteen genera (viz. *Aspicilia* A. Massal, *Brianaria* S. Ekman & M. Svenss, *Candelaria* A. Massal, *Canoparmelia* Elix & Hale, *Chrysothrix* Mont, *Cladonia* P. Browne, *Dermatocarpon* Eschw, *Heterodermia* Trevis, *Hyperphyscia* Müll. Arg, *Hypotrachyna* (Vain.) Hale, *Lecanora* Ach, *Parmotrema* A. Massal, *Phaeophyscia* Moberg, *Punctelia* Krog, Pyxine Fr.) of ten families (viz. Caliciaceae, Candelariaceae, Chrysotrichaceae, Cladoniaceae, Lecanoraceae, Megasporaceae, Parmeliaceae, Physciaceae, Psoraceae, Verrucariaceae) of lichenized fungi have been identified. Parmeliaceae and Physciaceae are the dominant families with six species each followed by Caliciaceae with three species. All these taxa have been recorded for the first time from Sikandra dhar region and deposited in CPUH ((The herbarium, Department of BioSciences, Career Point University Hamirpur).

539. **Thind, K.S. & Sharma, M.P. 1980.** "Two new species of *Calycellina* from India". *J. Indian Bot. Soc.* 59: 350–353.

Abstract: Two new species of *Calycellina* are described and illustrated from Dalhousie, Himachal Pradesh. *Calycellina tetraspora* was found on fallen twigs of *Rubus ellipticus* and C. *minuta* on decaying fronds of *Pteris critica*. A key is provided to separate these from each other and from C. *populina* which is previously recorded from India.

540. **Upreti, D.K. & Chatterjee, S. 2002.** "Lichen genus *Aspicilia* Massal. (Lecanorales) in India". *Phytotaxonomy* 2: 1–10.

Abstract: The paper deals with 10 species of lichen genus *Aspicilia* known from India. Almost all 10 species of *Aspicilia* present in the state of Himachal Pradesh.

541. **Upreti, D.K. & Nayaka, S. 2000.** An enumeration of lichens from Himachal Pradesh. In: Chauhan, D.K. (Ed.), *Recent Trends in Botanical Researches*. Botany Department, Allahabad University, Allahabad, India. Pp. 15–31.

542. **Vasudeva, S.M. & Kaur, J. 1997.** "Ferns of Simla hills (N.W. Himalayas)– Families: Sinoppteridaceae, Cryptogrammaceae, Pteridaceae, Hemionitidaceae, Dennstaedtiaceae and Hypolepidaceae". *Indian Fern J.* 14: 118–143.

Abstract: This paper pertains to taxonomic account of 22 taxa (20 species and two varieties) of ferns belonging to ten genera and six families from Simla Hills in North-Western Hiamalayas which are *Cheilanthes albomarginata, C. anceps, C. bicolour, C. brevifrons, C. chrysophylla, C. dalhousiae, C. subvillosa* and *Notholaena marantae* (Sinopteridaceae); *Cryptogramma brunoniana* (Cryptogrammaceae); *Pteris cretica, P. pseudoquadriaurita* and *P. vittata* (Pteridaceae); *Anogramma leptophylla, Coniogramme affinis, C. caudata, C. denticulata-serrata, C. indica, C. intermedia* var. *glabra* and *Gymnopteris vestita* (Hemionitidaceae); *Dennstaedtia scabra* (Dennstaedtiaceae); *Hypolepis punctata* and *Pteridium aquilinum* var. *wightianum* (Hypolepidaceae). Ecological distributional notes are appended for each species. Taxonomic confusions amongst various species/varieties of the concerned genera have been removed and cleared. Keys to the families, genera and species of the ferns have been provided for their easy identification.

543. **Verma, R.K., Prasher, I.B. & Sushma. 2019.** "New records of hyphomycetous fungi from north Western Himalayas". *J. New Biol. Rep.* 8(1): 1–7.

Abstract: *Stachybotrys chartarum* and *Xylohypha nigrescens* have been reported for the first time from North Western Himalayas and two species viz. *Helicosporium virescens* and *Stigmina obtecta* have been recorded for the first time from Himachal Pradesh.

544. **Vishvakarma, K.S. & Kaul, A. 1989.** "*Megaceros flagellaris* (Mitt.) Steph. in the North-Western Himalayas". *J. Econ. Taxon. Bot.* 13(3): 725–727.

Abstract: *Megaceros flagellaris* (Mitt.) Steph. is reported for the first time from the North-West Himalayas from Dalhousie, a considerable extension of range from its previously known locality in Darjeeling. Description and illustration is relation to morphology of thallus, spore elater capsule and chloroplast are incorporated.

New Discovery, New Reports and Rediscovery

545. **Agrawal, Sunita. 1982.** "*Swertia kingii* Hook.f.– A new record for north-west Himalayas". *J. Bombay Nat. Hist. Soc.* 79(2): 463.

Abstract: *Swertia kingii* Hook.f. has been reported for the first time for north-west Himalaya from Himachal Pradesh (Kangra) and Uttar Pradesh (Tehri Garhwal), earlier this species was reported from Sikkim only. Therefore the present finding of the taxon from North West Himalaya, records its extended distributional range from Eastern to Western Himalaya and suggest thereby phytogeographic affinity.

546. **Agrawal, Sunita & Bhattacharyya, U.C. 1984.** "*Gentiana argentea* var. *albescens* Franch. ex Forbes et Hemsley– A new record for India". *Bull. Bot. Surv. India* 26(1-2): 100–101.

Abstract: A new variety of *Gentiana argentea* viz., *G. argentea* var. *albescens* Franch. ex Forbes et Hemsley has been recorded for the first time for India from Himachal Pradesh (Lahul, Spiti, Kinnaur) and Uttar Pradesh (Chamoli, Tehri).

547. **Agnihotri, Priyanka & Husain, Tariq. 2008.** "A new variety of *Pedicularis pectinata* Wallich ex Benth. (Scrophulariaceae) from western Himalaya of India". *Phytotaxonomy* 8: 13–20.

Abstract: *Pedicularis pectinata* Wallich ex Benth. subspecies *pectinata* var. *roseus* P. Agnohotri & T. Husain, a new variety from Rohtang Pass in Kullu district of Himachal Pradesh is described. The complexity within *P. pectinata* has been discussed in detail and new subspecies *palans* of Pennel is being merged with subspecies *pectinata* as it does not show clear cut distinguishing cgaracters.

548. **Ambrish, K. & Kant, R. 2018.** "*Jasminum mesnyi* Hance (Oleaceae): A new record for Himachal Pradesh". *Indian Forester* 144(11): 1120–1121.

Abstract: *Jasminum mesnyi* Hance of the family Oleaceae has been reported for the first time for Himachal Pradesh from Naldhera, Shimla district. Earlier this species known to occur from Uttarakhand, Haryana, Uttar Pradesh and Maharashtra.

549. **Ambrish, K. & Srivastava, S.K. 2012.** "*Arnebia griffithii* Boiss. (Boraginaceae): A new record for India from Himachal Pradesh". *Rheedea* 22(2): 124–126.

Abstract: *Arnebia griffithii* Boiss. (Boraginaceae) is reported here as a new record to the flora of India from Spiti, Himachal Pradesh. It is earlier known to occur in Afghanistan and Pakistan. A detailed description, illustration and distribution of the species are provided.

550. **Ambrish, K. & Srivastava, S.K. 2013.** "A new species of *Arnebia* (Boraginaceae) from Himachal Pradesh, India". *J. Jap. Bot.* 88(5): 316–319.

Abstract: A new species of *Arnebia* (Boraginaceae), *A. bhattacharyyae* K. Ambrish & S. K. Srivast. allied to *A. hispidissima* (Lehm.) A. DC. is described and illustrated from Keylong, Lahaul, Himachal Pradesh, India.

551. **Arumugam, S., Murthy, G.V.S. & Nair, V.J. 2013.** "*Muhlenbergia rakhchamensis* (Poaceae)– A new species from Himachal Pradesh". *Indian J. Forest.* 36(1): 51–54.

Abstract: A new species of *Muhlenbergia,* viz., *M. rakhchamensis* allied to *M. uniflora* (Muhl.) Fernald and *M. japonica* Steud. has been described and illustrated from Rakhcham, Baspa valley, Kinnaur district of Himachal Pradesh.

552. **Aswal, B.S. 1985.** "*Meconopsis bikrami* Aswal (Papaveraceae). A new species from Lahul valley, Himachal Pradesh". *Indian J. Forest.* 8(1): 84–85.

Abstract: *Meconopsis bikrami* Aswal allied to *Mecanopsis aculeata* Royle has been described and illustrated from Koksar, Lahul valley, Himachal Pradesh.

553. **Aswal, B.S. & Goel, A.K. 1988.** "*Anaphalis himachalensis* (Asteraceae): A new species from N.W. India". *Nordic J. Bot.* 8(4): 337–338.

Abstract: A new species, *Anaphalis himachalensis* (Asteraceae) is described from the Lahaul Spiti district of Himachal Pradesh in North West Himalayas.

554. **Aswal, B.S. & Mehrotra, B.N. 1979.** "New records of plants from Himachal Pradesh, India". *Indian J. Forest.* 2(4): 322.

Abstract: Twelve species belonging to 10 genera have been recorded for the first time for the flora of Himachal Pradesh from Lahul valley in Lahul and Spiti district.

555. **Aswal B.S. & Mehrotra B.N. 1982.** "*Delphinium uncinatum* Hook.f. et Thoms. (Ranunculaceae) and *Lilium wallichianum* Schultes. f. (Liliaceae)– Two rare finds from North-West Himalaya". *J. Econ. Taxon. Bot.* 4(3): 991–994.

Abstract: *Delphinium uncinatum* Hook.f. et Thoms. has been rediscovered from Chamba district of Himachal Pradesh after a lapse of over 10 decades, earlier known from Banihal and *Lilium wallichianum* Schultes. f. rediscovered from Chamoli district of Uttar Pradesh after a lapse of over 13 decades, earlier known from Kumaon.

556. **Aswal B.S. & Mehrotra B.N. 1983.** "New records of plants from Himachal Pradesh, India– III". *J. Econ. Taxon. Bot.* 4(3): 991–994.

557. **Aswal B.S. & Mehrotra B.N. 1984.** "*Ranunculus bikramii*– A new species of Ranunculaceae from Lahul Valley (H.P.), India". *Indian J. Forest.* 7(1): 62–63.

Abstract: A new species of *Ranunculus* viz., *R. bikramii* allied to *R. hirtellus* Royle & *R. karakoramicola* Tamura has been described and illustrated from Rohtang, Lahul valley of Himachal Pradesh.

558. **Aswal, B.S., Goel, A.K. & Mehrotra, B.N. 1990.** "*Pedicularis rohtangensis* (Scrophulariaceae): A new species from Himachal Pradesh, India". *Feddes Repert.* 101: 109–111.

Abstract: A new species *Pedicularis rohtangensis* Aswal, Goel *et* Mehrotra, sp. nov. (Scrophulariaceae) collected from Rohtang slope (Himachal Pradesh) in North West Himalayas is described and illustrated.

559. **Bahar, N. 2005.** "Occurrence of *Eupatorium glandulosum* (Michx.) DC. in Chir Pine plantation: A threat to endemic flora". *J. Non-Timber Forest Prod.* 12(2): 102–103.

Abstract: *Eupatorium glandulosum* (Michx.) DC. is a Mexican species and introduced early in the past century. In the present paper the occurrence of this species in Chir pine plantation of Keori beat, Uhl range, Palampur Forest Division, Himachal Pradesh causes a threat to the endemic flora of this region.

560. **Balodi, B. & Uniyal, B.P. 1988.** "A new variety of *Gagea pamirica* Grossh. from Himachal Pradesh". *Bull. Bot. Surv. India* 30(1-4): 178.

Abstract: A new variety of *Gagea pamirica* Grossh. Viz., *G. pamirica* var. *spitiensis* has been described and illustrated from Lahul and Spiti, Himachal Pradesh.

561. **Basu, Debjani. 1984.** "*Leptodermis virgata* Edgew. ex. Hook. f. (Rubiaceae)– A rare plants from Mandi district (Himachal Pradesh)". *Bull. Bot. Surv. India* 26(3-4): 203–204.

Abstract: A rare plants *Leptodermis virgata* Edgew. ex. Hook. f. (Rubiaceae) has been reported for the first time from Mandi district, Himachal Pradesh. Though the species has been reported from Muree to Kulu including salt range 1200-2000 m by Hooker (1881), Brandis (1902), Bamber (1916) and Parker (1956), its herbarium record is very poor.

562. **Basu, Debjani. 1984.** "*Moneses uniflora* (L.) A. Gray (Pyrolaceae)– A new record for Himachal Pradesh". *J. Econ. Taxon. Bot.* 5(4): 969–971.

Abstract: *Moneses uniflora* (L.) A. Gray (Pyrolaceae) has been reported for the first time for the flora of Himachal Pradesh. Earlier this species was reported from Jammu & Kashmir.

563. **Bhattacharjee, Reba. 2006.** "Two new taxa of *Galium* L. (Rubiaceae) from India". *J. Econ. Taxon. Bot.* 30(3): 484–487.

Abstract: One new species *Galium falconeri* allied to *G. hirtiflora* Reqn. ex DC. from Uttaranchal and Himachal Pradesh and one new variety *Galium javanicum* Bl. var. *pulneyense* from Tamil Nadu are described with illustration.

564. **Chandrasekar, K. & Srivastava, S.K. 2004.** "*Elymus russellii* (Meld.) T.A. Cope (Poaceae)– A new distributional record for Himachal Pradesh". *Ann. Forest.* 11(1): 141–144.

Abstract: *Elymus russellii* (Meld.) T.A. Cope of the family Poaceae has been recorded for the first time for Himachal Pradesh from Pin Valley National Park, Lahaul-Spiti, so far known from Gilgit of Jammu & Kashmir in N.W. Hiamlaya. The occurrence of this species in Pin Valley National Park shows on extended distribution and constitutes a new record for the state of Himachal Pradesh.

565. **Chandrasekar, K. & Srivastava, S.K. 2004.** "A new record of *Elymus* L. (Poaceae) for India from Pin Valley National Park, Himachal Pradesh". *Phytotaxonomy* 4: 36–37.

Abstract: A new record of *Elymus* L., *Elymus nodosus* (Nevski) Meld. has been described as a new record for India from Pin Valley National Park, Himachal Pradesh.

566. **Chandrasekar, K. & Srivastava, S.K. 2004.** "*Elymus mutabilis* (Drobov) Tzvelev (Poaceae)– A new record for India from Pin Valley National Park, Himachal Pradesh". *Indian Forester* 130(12): 1475–1477.

Abstract: The occurrence of *Elymus mutabilis* (Drobov) Tzvelev (Poaceae) in Pin Valley National Park shows an extended distribution to the Indian Territory and constitutes a new record for India from the state of Himachal Pradesh.

567. **Chandrasekar, K. & Srivastava, S.K. 2005.** "*Oxytropis immersa* (Baker ex Aitch.) Bunge ex Fedtsch. (Fabacaeae)– A new record for India from Pin Valley National Park, Himachal Pradesh". *Indian J. Forest.* 28(2): 206–207.

Abstract: *Oxytropis immersa* (Baker ex Aitch.) Bunge ex Fedtsch. (Fabacaeae) is described as a new record for India from Pin Valley National Park, Lahaul-Spiti in Himachal Pradesh.

568. **Chandrasekar, K. & Srivastava, S.K. 2005.** "New plant records from Pin valley National Park, Himahal Pradesh". *J. Econ. Taxon. Bot.* 29(1): 232–236.

Abstract: Thirteen species belonging to nine genera under four families of flowering plants are reported for the first time from Pin Valley National Park, Lahaul-Spiti, Himachal Pradesh. Of these, eight species are new additions to the flora of Lahaul-Spiti, a cold desert of N.W. Himalaya, while five species are new records for the state of Himachal Pradesh. Their nomenclature, brief description, ecology, phenology and exsiccate are provided.

569. **Chandrasekar, K. & Srivastava, S.K. 2005.** "A new species of *Festuca* L. (Poaceae-Pooideae) from India". *J. Jap. Bot.* 80: 72-–75.

Abstract: A new species of *Festuca* L. (Poaceae), *F. sanjappae* K. Chandra Sekar & S.K. Srivastava allied to *F. alaica* Drobov is described and illustrated from Chhohem, Pin Valley National Prak, Himachal Pradesh, India.

570. **Chandrasekar, K. & Srivastava, S.K. 2007.** "A note on distributional record of *Spergularia diandra* (Guss.) Heldr. & Sart from Pin Valley National Park in India". *J. Bombay Nat. Hist. Soc.* 104(2): 251–252.

Abstract: The report of *Spergularia diandra* (Guss.) Heldr. & Sart from Pin Valley National Park, Lahul-Spiti in Himachal Pradesh shoiws an extended distribution of the taxon from the Gangetic plains to Alpine Himalaya and constitutes an addition to the flora of Himachal Pradesh.

571. **Chandrasekar, K. & Srivastava, S.K. 2008.** "Three new plant records for India from Pin Valley National Park, Himachal Pradesh". *Indian J. Forest.* 31(2): 291–293.

Abstract: Three species viz., *Aconitum bhutanicum* Yuchi Kadota, *Taraxacum lanigerum* van Soest and *T. ludlowii* van Soest have been described as new records for India from Pin Valley National Park, Lahaul-Spiti, Himachal Pradesh.

572. **Chandrasekar, K. & Srivastava, S.K. 2009.** "Four new plant records from Pin Valley National Park, Lahaul-spiti, Himachal Pradesh, India". *Indian Forester* 135(6): 858–860.

Abstract: Plant resources in the Pin valley National Park revealed four taxa which after scrutiny of relevant literature were found to be unknown from Lahual-Spiti. Of these, *Avena fatua* L. subsp. *meridionalis* Malz., *Epilobium royleanum* Hausskn. forma *glabrum* Raven and *Oxytropis hypoglottoides* (Baker) Ali were new records for the state of Himachal Pradesh, while *Helictotrichon virescens* (Nees ex Steud.) Henr. Was a new addition to the flora of Lahual-Spiti. These taxa have been arranged alphabetically and for each taxon currently accepted name with citation, basionym (if any), name of the family (in parenthesis), brief description, phenology, ecology, exsiccate, distribution in India and outside have been provided.

573. **Chandrasekar, K. & Srivastava, S.K. 2009.** "Additions to the flora of Lahaul-spiti from Pin Valley National Park". *J. Econ. Taxon. Bot.* 33(1): 22–25.

Abstract: Twenty species belonging to twenty genera under nine families have been recorded from Pin Valley National Park as new additions to the flora of Lahaul-Spiti, a cold desert of N.W. Himalaya.

574. **Chandrasekar, K., Srivastava, S.K. & Gaur, R.D. 2004.** "*Poa ludens* R.R. Stewart and *Poa poophagorum* Bor (Poaceae): Two new records for North-West Himalaya". *Rheedea* 14: 67–68.

Abstract: *Poa ludens* R.R. Stewart and *Poa poophagorum* Bor (Poaceae), so far reported from Central and Eastern Himalaya, are recorded for the first time from Pin Valley National Park in Himachal Pradesh, North-West Himalaya.

575. **Chandrasekar, K., Srivastava, S.K. & Singh, D.K. 2003.** "Some interesting plant records from Pin Valley National Park, Lahaul-Spiti, Himachal Pradesh". *Indian J. Forest.* 26(2): 97–99.

Abstract: Six species, viz., *Ailanthus altissima* (Mill.) Swingle, *Rhamnus triqueter* (Wallich) Brandis, *Morina longifolia* Wallich ex DC., *Acroptilon repens* (L.) DC., *Achyranthes aspera* L., *Persicaria capitata* (Buch.-Ham. ex D. Don) Gross have been recorded from Pin Valley National Park in Lahaul-Spiti, Himachal Pradesh as new additions to the flora of Lahaul-Spiti, a cold desert of N.W. Himalaya. Of these, *Acroptilon repens* (L.) DC. is a new record for the state of Himachal Pradesh as well.

576. **Chandrasekar, K., Srivastava, S.K., Singh, D.K. & Gaur, R.D. 2003.** "*Myricaria albiflora* Grierson & Long (Tamaricaceae)– A new record for North-West Himalaya". *Ann. Forest.* 11(2): 182–184.

Abstract: *Myricaria albiflora* Grierson & Long, so far known from Sikkim in Indian flora, has been recorded for the first time from Pin Valley National Park, Himachal Pradesh in North-West Himalaya. The occurrence of this taxon shows an extended distribution from Eastern Himalaya to North-West Himalaya. A brief description, nomenclature citation, ecology, phenology, exsiccate and illustration have been provided.

577. **Chandrasekar, K., Srivastava, S.K., Singh, D.K. & Gaur, R.D. 2003.** "*Poa hylobates* Bor (Poaceae)– A new record for India from Himachal Pradesh". *Ann. Forest.* 11(2): 185–186.

Abstract: *Poa hylobates* Bor, hitherto known to occur in Nepal, has been reported as a new record for India from Lanjuk, Pin Valley National Park, Lahaul-Spiti district of Himachal Pradesh.

578. **Chandrasekar, K., Srivastava, S.K., Singh, D.K. & Gaur, R.D. 2004.** "Additions to the flora of Himachal Pradesh from Pin Valley National Park". *Indian J. Forest.* 27(3): 317–319.

Abstract: Seven species, viz., *Calamagrostis stoliczkai* Hook.f., *Juncus bracteatus* Buchen., *Matthiola flavida* Boiss., *Parrya nudicaulis* (L.) Regel, *Persicaria perfoliata* (L.) H. Gross, *Ptilotrichum canescens* (DC.) C. Meyer and *Stellaria tibetica* Kurz have been recorded from Pin Valley National Park, Lahaul-Spiti as new additions to the flora of Himachal Pradesh.

579. **Chandrasekar, K., Srivastava, S.K., Singh, D.K. & Murti, S.K. 2003.** "Newly recorded taxa from Lahaul-Spiti, Himachal Pradesh". *Ann. Forest.* 11(1): 52–58.

Abstract: Twenty one species belonging to thirteen genera and six families of flowering plants are reported for the first time from Lahaul-Spiti, Himachal Pradesh. Of these, five species have been recorded for the first time (marked with *) for the Flora of Himachal Pradesh. Their nomenclature, brief descriptions, ecology, phenology and exsiccate are provided here.

580. **Chandrasekar, K., Srivastava, S.K., Singh, D.K. & Murti, S.K. 2003.** "Genus *Brachypodium* P. Beauv. (Poaceae) in India". *Phtotaxonomy* 3: 60–62.

Abstract: The present paper deals with the taxonomic and distributional status of genus *Brachypodium* P. Beauv. in India. Occurrence of *Brachypodium pinnatum* (L.) P. Beauv. in India flora from Pin Valley National Park, Himachal Pradesh is firmly established.

581. **Chaudhary, L.B. 1990.** "*Argyrolobium stenophyllum* Boiss. (Leguminosae-Papilionoideae)– Anew record for India". *Bull. Bot. Surv. India* 32(1-4): 186–188.

Abstract: *Argyrolobium stenophyllum* Boiss. has been recorded for the first time for India from Dalhousie, Himachal Pradesh.

582. **Choudhary, L.B. & Khan, Z.H. 2005.** "New distributional sites of some uncommon *Astragalus* L. (Fabaceae) in India". *Phytotaxonomy* 4: 57–63.

Abstract: The present paper records some new distributional sites of three species of *Astragalus* L. in India: *A. alpines* from Ladakh, *A. emodi* from Jammu & Kashmir and *A. drasianus* from Himachal Pradesh. Complete taxonomic details, including description, phenology, distribution, specimens examined, taxonomic notes and illustrations/ photographs of each species are provided for easy identification.

583. **Chauhan, R., Raina, R. & Chand, D. 2014.** "*Synedrella nodiflora* (L.) Gaertn (Asteraceae): New record to the flora of Himachal Pradesh, India". *Indian Forester* 140(7): 726–727.

Abstract: *Synedrella nodiflora* (L.) Gaertn of the family Asteraceae has been recorded for the first time for the flora of Himachal Pradesh from Nauni, Solan district at altitude of 1250 m.

584. **Choudhary, R.K., Lal, K. & Lee, Joongku. 2010.** "*Fallopia dentatoalata* (F. Schmidt) Holub (Polygonaceae): A new distributional record for India". *Indian J. Forest.* 33(4): 613–614.

Abstract: *Fallopia dentatoalata* (F. Schmidt) Holub (Polygonaceae) has been reported for the first time for India from Sangrah, Sirmour district of Himachal Pradesh. Detailed description, color photographs, SEM plates and relevant notes are provided to facilitate easy identification of the species.

585. **Chowdhery, H.J. 1982.** "*Elatine gracilis* Mason (Elatinaceae) - An addition to the Flora of India". *Bull. Bot. Surv. India* 24(1-4): 218–219.

Abstract: A North American weeds *Elatine gracilis* Mason of family Elatinaceae has been reported for the first time to the Indian flora from Jogendra Nagar, Mandi district, Himachal Pradesh.

586. **Chowdhery, H.J. & Murti, S.K. 1989.** "A new species of *Epilobium* L. (Onagraceae) from Himachal Pradesh, India". *Indian J. Forest.* 12(3): 244–246.

Abstract: A new species of *Epilobium* L., viz. *E. spitianum* allied to *E. palustre* L. has been described and illustrated from Gette, Spiti district of Himachal Pradesh.

587. **Chowdhery, H.J. & Rao, R.R. 1989.** "*Trigonella upendrae* H. Chowdhery *et* R.R. Rao, sp. nov. (Fabaceae)– A new species of *Trigonella* from Himachal Pradesh, India". *Bull. Bot. Surv. India* 31(1-4): 156–158.

Abstract: A new species of *Trigonella* viz., *Trigonella upendrae* H. Chowdhery *et* R.R. Rao allied to *T. corniculata* L. has been described and illustrated from Pangi village near P.W.D. Rest House, Kinnaur district, Himachal Pradesh.

588. **Chowdhery, H.J. & Singh, S. 1988.** "*Epilobium semiamplexicaule* Chowdhery *et* Singh– A new species of *Epilobium* Linn. (Onagraceae) from Himachal Pradesh, India". *Indian J. Forest.* 11: 80–82.

589. **Chowdhery, H.J. & Wadhwa, B. M. 1981.** "*Epilobium clarkeanum* Hausskn. and *E. wallichianum* Hausskn. ssp. *wallichianum*– New distributional records for north-western Himalaya". *Indian J. Forest.* 4(4): 329–330.

Abstract: Two interesting species of *Epilobium*, *viz., Epilobium clarkeanum* Hausskn. and *E. wallichianum* Hausskn. ssp. *wallichianum* has been reporded for the first time for North-Western Himalaya from Himachal Pradesh.

590. **Chowdhery, H.J. & Wadhwa, B. M. 1984.** "Some new or little known plants from Himachal Pradesh". *Indian J. Forest.* 7(1): 43–46.

Abstract: Twenty three species belonging to the family Poaceae, not reported previously from Himachal Pradesh or North-West Himalaya, are enumerated in this paper.

591. **Debta, M.R. & Ambrish, K. 2017.** "*Neodistemon indicum* (Wedd.) Babu & A.N. Henry– A new distributional record for Himachal Pradesh". *Phytotaxonomy* 17: 117–119.

Abstract: The present paper reports the occurrence of *Neodistemon indicum* (Wedd.) Babu & A.N. Henry belonging to the family Urticaceae for the first time from Marusidh, Col. Sher Jung National Park, Sirmaur, Himachal Pradesh as a new distributional record.

592. **Dhaliwal, D.S. & Sharma, M. 1995**. "*Oenothera affinis* Camb. (Onagraceae)– A new record for India from Himalaya". *Rheedea* 5(2): 151–153.

593. **Dubey, H.S. & Dixit, S.N. 1988.** "A new species of *Elymus* L. from North-West Himalaya". *J. Econ. Taxon. Bot.* 12(1): 227–229.

Abstract: A new species of *Elymus* L. viz., *E. harsukhii* allied to *Elymus jacquemontii* (Hook.f.) Cope has been described from Ladakh and Himachal Pradesh, North-West Himalaya.

594. **Ghildyal, N. 1986.** "Distributional note on some Indian sedges". *J. Bombay Nat. Hist. Soc.* 83(2): 470–471.

Abstract: Three sedges viz., *Carex curta* Gooden. from Uttar Pradesh, *Carex nigerrima* Nelmes and *Kobresia macrantha* Boeck. from Himachal Pradesh has been reported for the first time.

595. **Ghildyal, N. 1986.** "*Carex hebecarpa* Mey.– A new record from North-West Himalayas". *J. Bombay Nat. Hist. Soc.* 83(3): 680–681.

Abstract: *Carex hebecarpa* Mey. has been reported for the first time for North-West Himalaya from Shille, Himachal Pradesh.

596. **Ghildyal, N. & Aswal, B.S. 1985.** "Rediscovery of *Carex pamirensis* Clarke ex Fedt. (Cyperaceae) from Lahul valley (H.P.)". *Indian J. Forest.* 8(3): 241.

Abstract: *Carex pamirensis* Clarke ex Fedt. of the family Cyperaceae has been rediscovered from Lahul valley after a lapse of about 120 years. Previously it has been collected only once from Lahul, Himachal Pradesh by Jaeschke in 1862.

597. **Ghosh, Barin & Bhattacharyya, U.C. 1987.** "Three new varieties in Himalayan alpines". *J. Econ. Taxon. Bot.* 10(2): 310–312.

Abstract: Three new varieties, viz., *Senecio pedunculatus* Edgew. var. *albus*, *Thymus serpyllum* Linn. var. *album* and *Geranium aconitifolium* L'Herit. var. *album* have been described from Himachal Pradesh.

598. **Ghosh, S.R. 1983.** "*Crytomium macrophyllum* (Makino) Tagawa– A new record for India". *J. Econ. Taxon. Bot.* 4(2): 491.

Abstract: *Crytomium macrophyllum* (Makino) Tagawa has been reported for the first time to the fern flora of India from Chitra forest, Chamba, Himachal Pradesh. This species was earlier reported from China, Japan and Bhutan.

599. **Goel, A.K. & Acharyya, U.C. 1982.** "Rediscovery of three rarely collected plants from North-Western Himalaya". *Indian J. Forest.* 5(1): 7–20.

Abstract: The present communication deals with three plants, viz., *Galium cryptanthum* Hemsley (Rubiaceae), *Ajuga brachystemon* Maxim. (Lamiaceae) and *Saccolabium distichum* Lindl. (Orchidaceae) collected after more than 50 years from North-western Himalaya.

600. **Goel, A.K. & Aswal, B.S. 1987.** "*Juncus rohtangensis* Goel et Aswal (Juncaceae)– A new species from Himachal Pradesh, India". *Indian J. Forest.* 10(4): 262–263.

Abstract: A new species of *Juncus* L. viz., *J. rohtangensis* allied to *J. uniflorus* W.W. Smith has been described and illustrated from Rohtang Pass, Lahaul-Spiti, Himachal Pradesh.

601. **Goraya, G.S. & Naithani, H.B. 2018.** "*Toxocarpus himalensis* (Asclepiadaceae) A new record for Himachal Pradesh". *Indian Forester* 144(9): 875–876.

Abstract: *Toxocarpus himalensis* of the family Asclepiadaceae has been recorded for the first time for Himachal Pradesh from Karnody, Sundernagar. Earlier this species was reported from Assam, Sikkim, West Bengal, Arunachal Pradesh, Meghalaya, Nagaland and Mizoram.

602. **Janardhanan, K.P. 1973.** "On the occurrence of *Micromeria biflora* (Buch.-Ham. ex D. Don) Benth. var. *hispida* Kitamura & Murata (Lamiaceae) in Western Himalaya". *Bull. Bot. Surv. India* 15(1-2): 128.

Abstract: *Micromeria biflora* (Buch.-Ham. ex D. Don) Benth. var. *hispida* Kitamura & Murata (Lamiaceae) has been reported for the first time from India from Shoang and near Tangling Khud nala at Shongtong, Baspa valley, Kinnaur district, Himachal Pradesh. The present report, besides giving additional information on distribution, is significant in that it forms the first record of this variety from Indian in general and Western Himalaya in particular.

603. **Juyal, N., Aswal, B.S. & Mehrotra, B.N. 1984.** "Rediscovery of *Carex Borii* Nelmes (Cyperaceae) from Lahul valley (H.P.)". *Bull. Bot. Surv. India* 26(3-4): 223–224.

Abstract: *Carex Borii* Nelmes (Cyperaceae) has been rediscovered and collected from the type locality Lahul valley of Himachal Pradesh for the first time after a lapse of four decades. Further, a perusal of the literature shows that the species is endemic to the North-West Himalayas.

604. **Karki, R.S. 1987.** "*Atylosia elongata* Benth. (Fabaceae) in western Himalaya– A new distributional record". *J. Econ. Taxon. Bot.* 10(1): 181.

Abstract: *Atylosia elongata* Benth. (Fabaceae) has been reported for the first time for western Himalaya from Rajgarh, Sirmaur district of Himachal Pradesh. This species so far known from Assam and Meghalaya.

605. **Kaushal, P.S. & Jeffrey, C. 1987.** "The occurrence of *Crepis capillaries* (Compositae) in India and its distinction from *Crepis sancta*". *Kew Bull.* 42(2): 429–431.

Abstract: *Crepis capillaries* (L.) Wallr. (Compositae) is recorded for the first time for India from Mashobra, Simla, Himachal Pradesh and distinguished from *Crepis sancta* (L.) Babc., with which it had previously been confused.

606. **Kumar, Vinod & Gupta, B.K. 1990.** "Additions to the plants of Una district (H.P.)- I". *Indian J. Forest.* 13(2): 169–171.

Abstract: Fifty three species belonging to 51 genera under 27 families form new additions to the flora of Una district of Himachal Pradesh.

607. **Kumar, Vinod & Gupta, B.K. 1990.** "*Blepharis maderaspatensis* (L.) Heyne ex Roth– A new record for Himachal Pradesh". *J. Econ. Taxon. Bot.* 14(1): 221–222.

Abstract: *Blepharis maderaspatensis* (L.) Heyne ex Roth (Acanthaceae) has been recorded for the first time for the flora of Himachal Pradesh from Dhundala, Una district.

608. **Kumar, Vinod & Gupta, B.K. 1991.** "A note on occurrence of *Lagascea mollis* Cav. in North West Himalaya". *J. Econ. Taxon. Bot.* 15(2): 485–486.

Abstract: *Lagascea mollis* Cav. has been recorded in wild state from Dhundla in Himachal Pradesh which is its first ever report in wild state from North West Himalaya.

609. **Kumar, Vinod & Gupta, B.K. 1992.** "Additions to the plants of Una district (H.P.)– II". *Indian J. Forest.* 15(1): 78–80.

Abstract: Fifty two species belonging to 46 genera under 27 families form new additions to the flora of Una district of Himachal Pradesh.

610. **Lal, B., Singh, K.N., Chawla, Amit & Rajkumar, S. 2006.** "*Hernieria incana* Lam. (Caryophyllaceae)– New addition to the flora of Himachal Pradesh". *J. Econ. Taxon. Bot.* 30(3): 694–696.

Abstract: This article deals with the occurrence of *Hernieria incana* Lam. (Caryophyllaceae) as a new report to Himachal Pradesh. Collected from Joon area (Killar) in Pangi sub-division of Chamba district, this species has been found hitherto unknown to the flora of Himachal Pradesh. The details regarding taxonomic description and phenology of the species are given.

611. **Lal, B., Prakash, O., Sharma, V., Singh, R.D. & Uniyal, S.K. 2009.** "*Synedrella vialis* (Less.) A. Gray– A new record to the flora of Himachal Pradesh". *Indian Forester* 135(1): 89–91.

Abstract: *Synedrella vialis* (Less.) A. Gray (Asteraceae) is a new generic record to the flora of Himachal Pradesh. The plant has been collected from different localities of Kangra District, H.P. Morphological characters, habit and ecological notes of the plant are given to facilitate the identification.

612. **Lal, K. & Agrawala, D.K. 2009.** "New plant records for Himachal Pradesh". *J. Non-Timber Forest Prod.* 16(1): 61–62.

Abstract: Two species, namely *Leucomeris spectabilis* D. Don (Asteraceae) and *Sonerila tenera* Royle (Melastomataceae) are reported for the first time from Himachal Pradesh. This is also the first report of these two genera from Himachal Pradesh.

613. **Lal, K. & Agrawala, D.K. 2012.** "Notes on the family Burseraceae in Himachal Pradesh". *Indian J. Forest.* 35(3): 371–372.

Abstract: Occurrence of the family Burseraceae in Himachal Pradesh is discussed. *Garuga pinnata* Roxb. is recorded for the first time from this North-West Himalayan state. Occurrence of *Boswellia serrata* Roxb. ex Colebr. in this state is confirmed.

614. **Lal, K. & Rawat, G.S. 2008.** "Additions to the flora of Himachal Pradesh from Sirmaur district". *Indian J. Forest.* 31(1): 113–115.

Abstract: Six species of angiosperms are being reported for the first time for the state of Himachal Pradesh from Sirmaur district. The species are *Angelica archangelica* Linn. var. *himalaica* (Cl.) Nasir, *Diphylax griffithiii* (Hook.f.) Kranzl., *Onosma thomsoni* Hook.f., *Pueraria Montana* (Lour.) Merr. var. *chinensis, Trachelospermum axillare* Hook.f. and *Tricholepis roylei* Hook.f.

615. **Lal, K. & Rawat, G.S. 2009.** "Additions to the flora of Himachal Pradesh from Sirmour district-II". *Indian J. Forest.* 32(4): 611–612.

Abstract: Five species of angiosperms viz., *Chonemorpha fragrans* (Moon) Alston, *Glycosmis arborea* (Roxb.) DC., *Ipomoea sindica* Stapf, *Polygala erioptera* DC. and*Ventilago denticulata* Willd. are being reported here for the first time from the state of Himachal Pradesh from Sirmaur district.

616. **Lal, K. & Rawat, G.S. 2012.** "Additions to the flora of Himachal Pradesh from Sirmour district-III". *Indian J. Forest.* 35(2): 255–258.

Abstract: Present paper deals with the new distributional record of 11 flowering plant species for Himachal Pradesh. The species are *Crotalaria tetragona* Roxb. ex Andrews, *Dalbergia sericea* G. Don (Fabaceae), *Leucus nutans* (Roth.) Spreng. (Lamiaceae), *Mitreola petiolata* (J.F. Gmel.) Torrey & A. Gray (Loganiaceae), *Paederia foetida* L. (Rubiaceae), *Pilea microphylla* (L.) Liebm. (Urticaceae), *Plantago scabra* Moench (Plantaginaceae),

Spilanthes calva DC., *S. ciliata* Kunth (Asteraceae), *Striga angustifolia* (D. Don) Saldanha (Scrophulariaceae) and *Syzygium venosum* DC. (Myrtaceae).

617. **Lal, K. & Rawat, G.S. 2013.** "Additions to the flora of Himachal Pradesh from Sirmour district-IV". *Indian J. Forest.* 36(1): 143–145.

Abstract: In continuation to the series on 'Additions to the flora of Himachal Pradesh from Sirmour district', five new additions of angiosperm species viz., *Streblus asper* Lour. (Moraceae), *Hyptis suaveolens* (L.) Poit. (Lamiaceae), *Nelsonia canescens* (Lam.) Spreng. (Acanthaceae), *Marsdenia tenacissima* (Roxb.) Moon (Asclepiadaceae) and *Ipomoea triloba* L. (Convolvulaceae) are being reported here for the first time for the state of Himachal Pradesh from Sirmour district.

618. **Lal, K., Agrawala, D.K. & Chowdhery, H.J. 2008.** "Three new generic records of Ochidaceae from Himachal Pradesh". *J. Non-Timber Forest Prod.* 15(4): 293–296.

Abstract: Three species of Orchidaceae viz., *Dendrobium amoenum* Lindl., *Pholidota articulata* Lindl. and *Thunia bracteata* (Roxb.) Schltr. are reported for the first time from Himachal Pradesh. These also form the first report of the above genera from this state. The descriptions and photographs are provided here.

619. **Lal, K., Agrawala, D.K. & Chowdhery, H.J. 2009.** "Rediscovery of *Eria alba* Lindl. (Orchidaceae) from Himachal Pradesh after a gap of more than a century". *J. Non-Timber Forest Prod.* 16(3): 249–252.

Abstract: *Eria alba* Lindl. (Orchidaceae) is collected from Mandi district of Himachal Pradesh is discussed with description and illustration.

620. **Lal, K., Agrawala, D.K. & Chowdhery, H.J. 2010.** "New orchid records from Himachal Pradesh". *Indian J. Forest.* 33(4): 619–622.

Abstract: *Gastrochilus distichus* (Lindl.) Kuntze is reported for the first time in Himachal Pradesh and the occurrence of *Coelogyne cristata* Lindl. in Himachal Pradesh is confirmed.

621. **Lal, K., Agrawala, D.K. & Chowdhery, H.J. 2010.** "Rediscovery of *Eria alba* Lindl. (Orchidaceae) from Himachal Pradesh after a gap of more than a century". *Indian J. Forest.* 33(4): 647–650.

Abstract: *Eria alba* Lindl. (Orchidaceae) is recollected from Mandi district of Himachal Pradesh after a gap of more than a century. It was earlier recorded by Duthie in 1906 from Chamba district of Himachal Pradesh.

622. **Lal, K., Agrawala, D.K. & Pandey, A.K. 2012.** "*Duhaldea nervosa* (Wallich ex DC.) Andenberg (Asteraceae): A new record to the flora of Himachal Pradesh". *Pleione* 6(1): 257–259.

Abstract: Present paper deals with the new distributional record of *Duhaldea nervosa* (Wallich ex DC.) Anderberg (Asteraceae) in the Indian state of Himachal Pradesh

from Raicha, Sirmour district. Earlier this species was reported from Uttarakhand, Sikkim and Meghalaya.

623. **Lal, K., Rawat, G.S. & Pandey, A.K. 2012.** "*Taverniera cuneifolium* (Roth) Arnott (Fabaceae): A new distributional record to the flora of Himachal Pradesh, India". *Pleione* 6(2): 425–428.

Abstract: Present paper deals with the new distributional record of *Taverniera cuneifolium* (Roth) Arnott (Fabaceae) in Kandaiwala (Nahan), Sirmour district, Himachal Pradesh, India.

624. **Maheshwari, J.K. 1972.** "*Tagetes minuta* Linn. in Simla Hills". *J. Bombay Nat. Hist. Soc.* 69(2): 451.

Abstract: *Tagetes minuta* Linn., a native of South America has been reported first time from Simla Hills and is not mentioned in Collett's, 'Flora Simlensis'.

625. **Majumdar, N.C. 1974.** "*Lychnis stewartii* Edgew.– Its identity, description and distribution". *Bull. Bot. Surv. India* 16(1-4): 153–155.

Abstract: In the present paper the author transfers the genus *Lychnis* to *Silene* and a new combination was proposed as *Silene stewartii* (Edgew.) Majumdar. The species is allied to *S. persica* Boiss. subsp. *moorcroftiana* (Rohrb.) Chowdhuri. So far this species is known from limited area of Western Himalaya (Lahul and Chamba of Himachal Pradesh).

626. **Malhotra, C.L. & Mathur, R. 1985.** "*Cremanthodium hookeri* C.B. Clarke subsp. *polycephalum* R. Good– An over-looked taxon". *India J. Forest.* 8(3): 237–238.

Abstract: *Cremanthodium hookeri* C.B. Clarke subsp. *polycephalum* R. Good has been reported for the first time for Himachal Pradesh from Rahla, so far known to occur in Sikkim Himalaya. The present collection is from Rahla, Himachal Pradesh, far from its type locality (Sikkim Himalaya), is interesting from phytogeographical point of view.

627. **Mamgain, S.K. & Rao, R.R. 1985.** "A new species of *Lactuca* (Asteraceae) from Himachal Pradesh, India". *Bull. Bot. Surv. India* 27(1-4): 120–122.

Abstract: During the course of a revisionary study on the subtribe Lactuceae in India, the authors encountered some specimens which showed affinities with *Lactuca rapuncubides* Clarke in the general habit of plant, shape of upper and lower leaves, in the drooping nature of the inflorescence and in having outer involucral bracts much shorter than the inner. Critical examination of these specimens both at BSD and DD, particularly the achene character and the involucre, proved that these specimens belong to a new species, which is described here.

628. **Mathur, R.K. & Uniyal, B.P. 1985.** "*Bidens camosa* (Gray) Wiegand (Asteraceae)– An addition to Indian flora". *J. Econ. Taxon. Bot.* 6(2): 405–406.

Abstract: *Bidens camosa* (Gray) Wiegand (Asteraceae) has been reported for the first time for India from Jeori, Kinnaur district, Himachal Pradesh.

629. **Nair, N.C. 1964.** "Some plant records for Lahul and Spiti". *Bull. Bot. Surv. India* 6(2-4): 151–153.

Abstract: *Artemisia macrocephala* Jacq. ex Bess., *A. sacrorum* Ledeb., *Cyananthus lobatus* Wall. ex Benth., *Dontostemon glandulosum* (Kar. et Kir.) Schulz, *Gentiana marginata* Griseb., *G. sororkula* Burkill, *Microsisymbrium minutiflorum* (Hook.f. et Thoms.) Schulz, *Polygonum molliaeforme* Boiss., *P. polycnemoides* Jaub. et Spach., *Primula reptans* Hook.f., *Tanacetum nubigenum* Wall., *T. tripinnatifidum* Oliver and *Taraxacum wattii* Hook. f. are reported from Lahul and Spiti.

630. **Nair, N.C. 1964.** "A new species of *Gentiana* from North-Western Himalayas". *Bull. Bot. Surv. India* 6(2-4): 295–296.

Abstract: A new species of *Gentiana* viz. *G. spitiensis* allied to *G. decorata* Diels has been described and illustrated from Chadratal Lake, Spiti, Himachal Pradesh.

631. **Nair, N.C. & Pant, P.C. 1966.** "Some new distribution records for North Western Himalayas". *Bull. Bot. Surv. India* 8(1): 75–77.

Abstract: Four plant species viz., *Tephrosia strigosa* (Dalz.) Santapau et Mahesh., *Tagetes minuta* L., *Gomphrena celosioides* Mart. and *Euphorbia prostrata* Ait. has been reported as new distribution records for North Western Himalayas from inner valleys of Mahasu and Kinnaur districts of Himachal Pradesh.

632. **Naithani, H.B. 1988.** "Occurrence of *Pistacia atlantica* Desf. ssp. *cabulica* (Stocks) Rech.f. in Himachal Pradesh". *J. Bombay Nat. Hist. Soc.* 85(2): 461.

Abstract: *Pistacia atlantica* Desf. ssp. *cabulica* (Stocks) Rech.f. was reported for the first time for India from Siplo village, Kinnaur district, Himachal Pradesh. This species occur in Afghanistan, southern Iran and Pakistan.

633. **Naithani, H.B. & Uniyal, B.P. 1982.** "A new variety of *Chorisopora scabulosa* Camb. (Brassicaceae) from India". *Indian J. Forest.* 5(3): 245.

Abstract: A new variety of *Chorisopora scabulosa* Camb. viz., *C. scabulosa* var. *eglandulosa* Narayanswamy ex Naithani & Uniyal has been described from Bara Lacha, Lahul, Himachal Pradesh.

634. **Naithani, H.B. & Uniyal, B.P. 1988.** "*Briza minor* Linn. (Poaceae) in North-west Himalaya". *J. Bombay Nat. Hist. Soc.* 85(3): 657–658.

Abstract: *Briza minor* Linn. (Poaceae) has been reported for the first time for Himachal Pradesh from Tangroti, Kangra district. Detailed description is also given to facilitate the identification of this grass.

635. **Naithani, H.B., Chandra, Sumer & Aswal, B.S. 1986.** "*Oxytropis sericopetala* C.E.C. Fischer (Fabaceae)– A new record for India". *J. Bombay Nat. Hist. Soc.* 83(2): 473–474.

Abstract: *Oxytropis sericopetala* C.E.C. Fischer has been reported for the first time for the flora of India from Kaza Spiti in Himachal Pradesh. Earlier this species is known only from Tibet.

636. **Negi, P.S. 2017.** "A report on occurrence of *Swertia chirayita* (Roxb.) Buch.-Ham. ex C.B. Clarke in Kinnaur district of Himachal Pradesh". *Indian Forester* 143(11): 1213–1214.

Abstract: *Swertia chirayita* (Roxb.) Buch.-Ham. ex C.B. Clarke has been reported for the first time for Kinnaur district, Himachal Pradesh from Bari Kanda of Bari Beat, Sungra block, Nichar range and Kungshai Kanda of Taranda Beat, Bhaba Nagar Range.

637. **Prakash, O., Jaryan, V., Sharma, V., Vats, S.K., Uniyal, S.K., Lal, B., Singh, R.D. & Guleria, S.K. 2009.** "*Soliva anthemifolia* (Juss.) R.Br. (Asteraceae)– A new generic record to the flora of Himachal Pradesh". *J. Econ. Taxon. Bot.* 33(4): 829–831.

Abstract: The present paper highlights the occurrence of *Soliva anthemifolia* (Juss.) R.Br. as a new generic record to the flora of Himachal Pradesh from Pong Dam wetland area of district Kangra, Himachal Pradesh. This species has been found hitherto unknown to the flora of Himachal Pradesh. Notes on its morphological characters, habit and habitat are given.

638. **Prakash, V. & Mehrotra, B.N. 1994.** "A new species of *Valeriana* L. (Valerianaceae) from Himachal Pradesh, India". *Rheedea* 4: 70–73.

Abstract: A new species of *Valeriana* L. viz. *V. himachalensis* allied to *V. roylei* Klotz. ex Garcke is described with illustrations from Thali forest, Himachal Pradesh. The distinguishing characters are tabulated.

639. **Purohit, K.M. & Panigrahi, G. 1983.** "A new species of *Spiraea* L. (Rosaceae) from Himachal Pradesh, India". *Bull. Bot. Surv. India* 25(1-4): 230–231.

Abstract: A new species of *Spiraea* viz. *S. chambaensis* Purohit *et* Panigrahi allied to *S. cantoniensis* Lour. has been described and illustrated from Satrundi, Chamba district, Himachal Pradesh.

640. **Pusalkar, P.K. 2015.** "New plant records in Himachal flora". *Ann. Forest.* 23(2): 119–125.

Abstract: Four species, *Stellaria montioides* (Edgew. & Hook.f.) Ghaz. (Caryophyllaceae), *Gentianopsis paludosa* (Munro ex Hook.f.) Ma var. *alpina* T.N. Ho (Gentianaceae), *Koenigia tortuosa* (D. Don) T.M. Schust. & Reveal var. *tibetana* (Meisn.) T.M. Schust. & Reveal (Polygonaceae) and *Potentilla clarkei* Hook.f. (Rosaceae) are reported here as new records for the flora of Himachal Pradesh. Of these, *Gentianopsis*

paludosa var. *alpina* a new record for Indian flora as well. The paper also reports eastward extended distribution for *Potentilla clarkei*, hitherto known as Kashmir endemic and *Stellaria montioides*, an overlooked trans-Himalayan species.

641. **Pusalkar, P.K. & Ambrish, K. 2017.** "*Koenigia tortuosa* (D. Don) T.M. Schust. & Reveal var. *glabrifolia* (S.P. Hong) T.M. Schust. & Reveal (Polygonaceae)– A new record for Indian flora". *Phytotaxonomy* 17: 20–23.

Abstract: *Koenigia tortuosa* (D. Don) T.M. Schust. & Reveal var. *glabrifolia* (S.P. Hong) T.M. Schust. & Reveal (Polygonaceae) is reported here as a new record for Indian flora from Spiti valley (Himachal Pradesh) cold desert of western Himalaya.

642. **Pusalkar, P.K. & Singh, D.K. 2008.** "New records for the flora of Himachal Pradesh". *Ann. Forest.* 16(1): 87–91.

Abstract: Five angiosperm taxa, viz., *Campanula modesta* Hook.f. & Thomson (Campanulaceae), *Geranium rubifolium* Lindl. (Geraniaceae), *Orobanche cernua* Loefl. var. *pseudoclarkei* S.M.H. Jafri (Orobanchaceae), *Aconogonon campanulatum* (Hook.f.) Hara (Polygonaceae) and *Ranunculus ficariifolius* H. Leveille & Vaniot (Ranunculaceae) are reported as new records for the flora of Himachal Pradesh.

643. **Pusalkar, P.K. & Singh, D.K. 2010.** "New plant from western Himalaya". *Ann. Forest.* 18(1): 55–62.

Abstract: Five taxa, viz., *Cotinus coggygria* Scop. var. *glaucophylla* C.Y. Wu (Anacardiaceae), *Stellaria congestiflora* H. Hara (Caryophyllaceae), *Sinocrassula indica* (Decne.) A. Berger var. *viridiflora* K.T. Fu (Crassulaceae), *Thalictrum alpinum* L. var. *elatum* Ulbr. (Ranunculaceae) and *Lagotis kunawurensis* (Royle ex Benth.) Rupr. var. *sikkimensis* (Hook.f.) T. Yamaz. (Selaginaceae), are reported as new records for the flora of Indian Western Himalaya. Of these, *Cotinus coggygria* var. *glaucophylla* from Jammu & Kashmir, Himachal Pradesh & Uttarakhand and *Sinocrassula indica* var. *viridiflora* from Himachal Pradesh & Uttarakhand are new records for the flora of India as well.

644. **Pusalkar, P.K. & Singh, D.K. 2012.** "New floristic records from Himachal Pradesh". *Ann. Forest.* 20(1): 105–109.

Abstract: Four taxa, viz., *Androsace delavayi* Franch., *Androsace villosa* L. (Primulaceae), *Lindelofia longiflora* (Benth.) Baill. var. *levingii* (C.B. Clarke) Brand and *Pseudomertensia moltkioides* (Royle ex Benth.) Kazmi var. *leichtlinii* Kazmi (Boraginaceae) are reported as new records for the flora of Himachal Pradesh. Of these taxa, *Pseudomertensia moltkioides* var. *leichtlinii* is a new record for India as well.

645. **Pusalkar, P.K. & Srivastava, S.K. 2013.** "Distributional novelties in Himachal flora". *Phytotaxonomy* 13: 132–36.

Abstract: Seven taxa, namely *Achyranthes porphyristachya* Wall. ex Moq. (Amaranthaceae), *Chenopodium karoi* (Murr) Aellen (Chenopodiaceae), *Lappula himalayensis* Ching J. Wang (Boraginaceae), *Leontopodium pusillum* (Beauv.) Hand.-Mazz. (Asteraceae), *Mattiastrum himalayense* (Klotzsch.) Brand (Boraginaceae), *Salsola tragus* L. (Chenopodiaceae) and *Saussurea jacea* (Klotzsch.) C.B. Clarke var. *tomentosa* Lipsch. (Asteraceae) are reported as additions to the flora of Himachal Pradesh. Of these, *Lappula himalayensis* is a new record for Indian flora as well.

646. **Pusalkar, P.K. & Srivastava, S.K. 2016.** "Breaking point endemism of *Ranunculus bikramii* Aswal & Mehrotra (Ranunculaceae)– New locality report from Jammu & Kashmir, Himachal Pradesh and Uttarakhand". *India J. Forest.* 39(3): 263–265.

Abstract: *Ranunculus bikramii* Aswal & Mehrotra (Ranunculaceae), a point of endemic species from Rohtang Pass, Lahaul-Spiti district, Himachal Pradesh is reported is reported here as new record for the flora of Uttarakhand and Jammu & Kashmir. Furthermore, additional distributional localities in Himachal Pradesh are also provided recording wider distribution range with locally common occurrence for this Indian Western Himalayan endemic species.

647. **Pusalkar, P.K., Singh, D.K. & Srivastava, S.K. 2011.** "Newly recorded plants in Himachal flora". *Ann. Forest.* 19(2): 271–276.

Abstract: Four taxa, viz., *Anemone obtusiloba* D. Don var. *potentilloides* Lauener (Ranunculaceae), *Arenaria kumaonensis* Maxim. (Caryophyllaceae), *Chionachne koenigii* (Spreng.) Thw. (Poaceae) and *Parnassia kumaonica* Nekrass (Parnassiaceae) are reported as new records for the flora of Himachal Pradesh.

648. **Pusalkar, P.K., Singh, D.K. & Srivastava, S.K. 2014.** "New and noteworthy plant records in Western Himalayan flora". *Ann. Forest.* 22(1): 49–56.

Abstract: *Solidago dahurica* (Kitag.) Kitag. ex Juz. (Asteraceae) is recorded as a new record for Indian flora from Himachal Pradesh. *Corydalis stracheyi* var. *ecristata* Prain (Papaveraceae-Fumarioideae), *Drymaria villosa* Cham. & Schlecht. (Caryophyllaceae) and *Juncus allioides* Franch. (Juncaceae) are reported as new records for Western Himalayan flora. Eastward extension in distributional limit of *Corydalis stracheyi* Duthie ex Prain (Papaveraceae-Fumarioideae) is reported from Himachal Pradesh, forming a new record for the state flora. Similarly, *Juncus allioides* Franch. and *J. bufonius* L. var. *congestus* Wahlenb. (Juncaceae) are recorded as additions to the state flora of Himachal Pradesh and Uttarakhand. Additionally, the presence of hitherto believed Chinese endemic *Corydalis adunca* Maxim. (Papaveraceae-Fumarioideae) in Indian flora is also confirmed.

649. **Rana, T.S., Datt, Bhaskar & Nair, K.N. 2005.** "Himalayan Caper (*Capparis spinosa* L. var. *himalayensis* (Jafri) Jacobs: A botanically curious plant". *Phytotaxonomy* 5: 73–75.

Abstract: The present paper highlights various aspects of the Himalayan Caper, *Capparis spinosa* L. var. *himalayensis* (Jafri) Jacobs based on a study carried out by the authors during their field trips to various parts of the Himalayan region i.e. Uttarakhand (Garhwal Himalaya) and Himachal Pradesh.

650. **Rao, R.R. & Chowdhery, H.J. 1984.** "*Arabidopsis russelliana* Jafri, an addition to the Brassicaceae of India". *Indian J. Forest.* 7(3): 257–258.

Abstract: *Arabidopsis russelliana* Jafri endemic to Karakoram, Pakistan has been reported here for the first time for India from Kilba, Kinnaur district of Himachal Pradesh.

651. **Rau, M.A. & Rao, T.A. 1961.** "Some plant records– IV". *Bull. Bot. Surv. India* 3(1): 29–30.

Abstract: Brief notes are given on three rare plants of the Western Himalayas, viz. *Stylophorum lactucoides* Baill. (Papaveraceae), *Triosteum hirsutum* Wall. (Caprifoliaceae) and *Epipogium tuberosum* Duthie (Orchidaceae). The last named, a terrestrial, leafless orchid previously known only from Kashmir, has now been collected in the Kulu Himalayas.

652. **Rawat, R.S., Kapoor, K.S., Subramani, S.P. & Jishtu, V. 2007.** "*Elaeagnus angustifolia* Linn.: An addition to the flora of Lahaul & Spiti (A Cold Desert in North West Himalayas)". *Ann. Forest.* 15(1): 97–100.

Abstract: Reporting of *Elaeagnus angustifolia* Linn. (Elaeagnaceae) from Tabo (Spiti) as an addition to the flora of Lahaul & Spiti (A Cold Desert in North West Himalayas) has been discussed. Description, illustration and relevant notes on the said species have also been elaborated in this manuscript.

653. **Sanjappa, M. 1986.** "Two new species of *Indigofera* L. (Fabaceae) from Western Himalayas". *Bull. Bot. Surv. India* 28(1-4): 225–228.

Abstract: Two new species of *Indigofera* L. viz., *I. gangetica* allied to *I. heteranthae* Wall. ex Brandis from Himachal Pradesh and Uttar Pradesh, another new species *I. chitralensis* allied to *I. dosuae* Buch.-Ham. ex D. Don from Jammu & Kashmir has been described and illustrated.

654. **Shah, R. & Naithani, H.B. 2012.** "*Modiola caroliniana* (Linn.) G. Don– An addition to the flora of Himachal Pradesh". *Indian Forester* 138(3): 304.

Abstract: *Modiola caroliniana* (Linn.) G. Don has been reported for the first time for the flora of Himachal Pradesh from Nabha, Shimla district, earlier reported from Uttarakhand.

655. **Sharma, A., Singh, N., & Adamowski, W. 2019.** "Scully's Balsam *Impatiens scullyi* Hook.f. (Balsaminaceae): A new record for India from Himachal Pradesh". *J. Threatened Taxa* 11(8): 14065–14070.

Abstract: *Impatiens scullyi* Hook.f. is reported here as a new record for India as well as for the western Himalaya from Kullu and Mandi districts of Himachal Pradesh. To facilitate its identification, detailed description along with colour images are provided here.

656. **Sharma, B.D. 2015.** "Tropical Cucurbitaceous species naturalised in the Shimla city forest". *J. Non-Timber Forest Prod.* 22(3): 177–179.

Abstract: Tropical and sub-tropical Cucurbitaceous species viz., *Momordica cymbalaria* Fenzl ex Naudin has been reported and naturalized for the first time in the temperate Shimla city forest from Chauramaidan, north side of H.P Bidhan Sabha.

657. **Sharma, M. & Dhaliwal, D.S. 1997.** "*Raphanus raphanistrum* Linn. (Cruciferae)– An alien weed established in Kullu District (Himachal Pradesh)". *Indian Forester* 123(9): 870–872.

Abstract: An alien weed, *Raphanus raphanistrum* Linn. of the family Cruciferae has been reported for the first time for India from Kullu district of Himachal Pradesh.

658. **Sharma, M. & Dhaliwal, D.S. 1997.** "Additions to the flora of Himachal Pradesh from Kullu district". *J. Bombay Nat. Hist. Soc.* 94(2): 447–450.

Abstract: In the present paper 32 species has been reported for the first time for the flora of Himachal Pradesh.

659. **Sharma, M. & Dhaliwal, D.S. 2000.** "*Lactuca graciliflora* DC. (Asteraceae)– An additions to the flora of Himachal Pradesh". *J. Bombay Nat. Hist. Soc.* 97(2): 313–314.

Abstract: *Lactuca graciliflora* DC. has been reported for the first time to the flora of Himachal Pradesh from Kullu district.

660. **Sharma, M. & Kaur, H. 1999.** "Additions to the flora of Himachal Pradesh from Sirmaur district". *J. Bombay Not. Hist. Soc.* 96(1): 93–97.

Abstract: 51 species of flowering plants recorded from Sirmaur district of Himachal Pradesh, hitherto not reported from the state, have been listed along with pertinent information on their habits and habitat.

661. **Sharma, O.P. & Nag, D.R. 1974.** "*Scleria psilorrhiza* – New to Northern India". *Indian Forester* 100(3): 203–205.

Abstract: *Scleria psilorrhiza* C.B. Clarke is reported from Himachal Pradesh. It is a stoloniferous sedge, having premorse leaves with the leaf sheath conspicuously winged. Inflorescence is a terminal panicle. Nut is ovoid, 3.5-4.0 mm long, smooth, shining, hard, not beaked; disk triangular, reflexed, shallowly and obtusely 4-lobed.

662. **Sharma, P. & Uniyal, P.L. 2008.** "*Ephedra sumlingensis* (Ephedraceae)– A new species from Himachal Pradesh, India". *Bull. Bot. Surv. India* 50(1-4): 179–182.

Abstract: A new species *Ephedra sumlingensis* allied to *E. intermedia* Schrenk & Meyer has been described and illustrated from Sumling, Spiti district of Himachal Pradesh.

663. **Sharma, V. & Uniyal, S.K. 2009.** "*Aeginetia indica* L.– A new record to the flora of Himachal Pradesh". *Indian J. Forest.* 32(1): 127–130.

Abstract: The present communication reports *Aeginetia indica* L. (Orobanchaceae) as a new generic record to the flora of Himachal Pradesh. The plant was found growing in Malan locality of district Kangra on the roots of *Dendrocalamus strictus*.

664. **Singh, G., Rai, I.D., Rawat, G.S. & Goraya, G.S. 2013.** "*Neottia pinetorum* (Orchidaceae): A new record to the flora of Himachal Pradesh, India". *Indian Forester* 139(6): 566–567.

Abstract: A gregarious patch having more than 50 individual in 0.5 hectare area of *Neottia pinetorum* (Lindl.) Szlach. of family Orchidaceae has been recorded for the first time to the flora of Himachal Pradesh from Dhela Thatch at geographical coordinates if latitude 31°45'45.20" N and longitude 77°27'57.24" E (3400 m.). This locality record of the species is nearly 300 km straight line distance from the previously known locality in Amrit Ganga Valley (Chamoli district) of the adjoining state of Uttarakhand. This range extension of *N. pinetorum* is likely being as a result of ban on grazing and recovery of the suitable habitats in recent times, lead to the colonization of this species in newer area.

665. **Singh, H. & Sharma, M. 1988.** "*Gnaphalium coarctatum* Willd.– A south American taxon naturalised in Chamba district (Himachal Pradesh), India". *Bull. Bot. Surv. India* 30(1-4): 181–184.

Abstract: A south American taxon *Gnaphalium coarctatum* Willd. has been reported for the first time to the Indian flora from Chamba district of Himachal Pradesh.

666. **Singh, N.B. 1982.** "A note on *Rhodiola imbricata* Edgew.". *J. Econ. Taxon. Bot.* 3: 625–626.

Abstract: *Rhodiola imbricata* Edgew. has been reported from Jammu & Kashmir, Himachal Pradesh and Sikkim for the first time, earlier this was reported from Uttar Pradesh (Uttarakhand)

667. **Singh, N.B. & Bhattacharyya, U.C. 1983.** "A new variety of *Rhodiola imbricata* Edgew. (Crassulaceae) from India". *Bull. Bot. Surv. India* 25(1-4): 246–248.

Abstract: A new variety of *Rhodiola imbricata* Edgew. viz. *R. imbricata* var. *lobulata* allied to *R. imbricata* var. *imbricata* has been described from Sach Pass, Himachal Pradesh.

668. **Singh, P.B. 1997.** "New records of plants from Himachal Pradesh, India– III". *J. Econ. Taxon. Bot.* 21(1): 223–224.

Abstract: Ten species has been recorded for the first time for the flora of Himachal Pradesh from Mandi district.

669. **Singh, P.B. 1998.** "*Striga asiatica* Kuntze var. *albiflora* (Kuntze) Santapau (Scrophulariaceae) in Western Himalaya". *Indian J. Forest.* 21(1): 72–73.

Abstract: *Striga asiatica* Kuntze var. *albiflora* (Kuntze) Santapau, a taxon so far known from Maharashtra (Bombay) and Tamil Nadu has been reported first time from Himalaya from Gahera, Mandi district of Himachal Pradesh. The present findings extend its known range of distribution to Western Himalaya.

670. **Singh, P.B. 2001.** "Occurrence of *Berberis petiolaris* var. *garhwalana* Ahrendt in Himachal Pradesh". *J. Non-Timber Forest Prod.* 8(1/2): 106–108.

Abstract: *Berberis petiolaris* var. *garhwalana* Ahrendt, so far known from only Uttaranchal and considered as endemic to this regions reported here for the first time for the flora of Himachal Pradesh from Naggar, Kullu district.

671. **Singh, P.B., Aswal, B.S. & Gaur, R.D. 1993.** "New records of plants from Himachal Pradesh, India". *Indian J. Forest., Addit. Ser. 7*: 341–347. [In: Gupta, B.K. (Ed.), Higher Plants of Indian Subcontinent IV. Bishen Singh Mahendra Pal Singh, Dehra Dun].

Abstract: Twenty nine species belonging to 25 genera under 21 families has been recorded as new to the flora of Himachal Pradesh from Mandi district.

672. **Singh, P.B., Aswal, B.B. & Gaur, R.D. 1994.** "New records of plants from Himachal Pradesh, India-II". *Indian J. Forest.* 17(1): 78–79.

Abstract: Nine species belonging to 9 genera under 9 families has been recorded for the first time for the flora of Himachal Pradesh.

673. **Singh, R.D. & Sinha, B.K. 1992.** "*Polygonum hydropiper* L. var. *flaccidum* (Meissn.) Steward from Kandbari– A new record for Himachal Pradesh". *J. Econ. Taxon. Bot.* 16: 577–578.

Abstract: *Polygonum hydropiper* L. var. *flaccidum* (Meissn.) Steward, usually a taller leaves species than *P. hydropiper* has been recorded for the first time for Himachal Pradesh from Kandbari.

674. **Singh, S., Chandrasekar, K., Singh, S., Singh, D.K. & Uniyal, B.P. 2003.** "Additions to the flora of Himachal Pradesh". *J. Hill Res.* 16(1): 49–50.

675. **Singh, S., Chandrasekar, K., Roy, P.S., Singh, S., Singh, D.K., Uniyal, B.P. & Chandrashekhar, M.B. 2003.** "Additions to the flora of Lahaul-Spiti, Himachal Pradesh". *Ann. Forest.* 11(1): 59–62.

Abstract: Lahaul-Spiti district of Himachal Pradesh is part of the cold desert in trans-Himalayas. The climate is very harsh. Flora is quite unique. Nine species, viz., *Ranunculus scleratus* L., *Hymenolobus procumbens* (L.) Nutt. ex Torrey & Gray, *Myricaria squamosa*

Desv., *Lavatera cachemiriana* Cambess., *Tribulus terrestris* L., *Colutea nepalensis* Sims, *Salsola collina* Poll., *Arceuthobium minutissimum* Hook.f. and *Gymnadenia orchidis* Lindl. have been recorded from Lahaul-Spiti region as new recocords to the flora of Himachal Pradesh.

676. **Sinha, B.K. & Ram Das, V.S. 1991.** "*Crassocephalum crepidioides* (Benth.) S. Moore from Palampur– A new record for Himachal Pradesh". *J. Econ. Taxon. Bot.* 15(3): 737–738.

Abstract: *Crassocephalum crepidioides* (Benth.) S. Moore has been recorded for the first time for the state of Himachal Pradesh from Palampur.

677. **Srivastava, A., Debta, M.R., Srivastava, S.K. & Dangwal, L.R. 2016.** "*Catamixis baccharoides* Thomson (Asteraceae), a new record for Himachal Pradesh". *Indian J. Forest.* 39(4): 363–366.

Abstract: The paper deals with the discovery of a new population of threatened taxa *Catamixis baccharoides* Thomson. The species is first time recorded for the state of Himachal Pradesh from Marusidh cliff, Sher Jung N.P., Sirmaur district.

678. **Srivastava, A., Thakur, R., Srivastava, S.K. & Dangwal, L.R. 2017.** "New population record of the endemic and endangered tree *Pittosporum eriocarpum* from Himachal Pradesh". *Indian J. Forest.* 40(2): 185–188.

Abstract: The paper deals with the new locality record of *Pittosporum eriocarpum* Royle from Himachal Pradesh along with note on previous erroneous records from the state.

679. **Srivastava, S.K. 1985.** "*Jasminum parkeri* Dunn– An endangered, endemic taxon from Himachal Pradesh". *J. Econ. Taxon. Bot.* 7(3): 709–710.

Abstract: An endangered, endemic taxon, *Jasminum parkeri* Dunn has not been collected for last six to seven decades from the state of Himachal Pradesh since the date of collection of its holotype.

680. **Subramani, S.P. & Kapoor, K.S. 2011.** "New distributional records of two little known orchids of Himachal Pradesh from Churdhar Wildlife Sanctuary, Sirmaur district, India". *Int. J. Biol. Technol.* 2(2): 8–11.

Abstract: *Chusua nana* (King & Pantling) Pradhan and *Hetaeria fusca* Lindl. are two little-known orchids collected from Churdhar Wildlife Sanctuary, Shivalik hills of Sirmaur district, forms new distribution records and second report to the state Himachal Pradesh. Very small numbers of individuals of population observed were described along with distribution, phenology and ecological notes.

681. **Sud, Gunjan. 2012.** "*Blumea viscosa* (Mill.) V.M. Badillo (Asteraceae)– A new floristic record from Kangra, for Himachal Pradesh". *Indian J. Forest.* 35(3): 351–352.

Abstract: *Blumea viscosa* (Mill.) V.M. Badillo (Asteraceae) unknown from the state of Himachal Pradesh (India) till now is being reported for the first time from Rajiana, a village in Kangra district.

682. **Sud, Gunjan. 2012.** "*Blumea oxydonta* DC. (Asteraceae)– An addition to the flora of Himachal Pradesh". *J. Econ. Taxon. Bot.* 36(3): 652–654.

Abstract: *Blumea oxydonta* DC. has been reported for the first time from Kangra district of Himachal Pradesh. A brief description along with a photograph of the plant has been provided for facilitating identification.

683. **Sud, Gunjan. 2012.** "*Acmella ciliata* (Kunth) Cass. (family- Asteraceae)– A new record for the flora of Western Himalayas". *J. Econ. Taxon. Bot.* 36(4): 663–665.

Abstract: *Acmella ciliata* (Kunth) Cass., so far known from Central and South India, is being reported for the first time for the Western Himalaya from Kangra district of Himachal Pradesh.

684. **Sud, Gunjan. 2016.** "*Pilosella echioides* (Lumnitzer) F.W. Schultz & Schultz Bipontinus (Asteraceae) a lesser known taxon from Himachal Pradesh". *Indian Forester* 142(7): 708.

Abstract: Alesser known taxon, *Pilosella echioides* (Lumnitzer) F.W. Schultz & Schultz Bipontinus (Asteraceae) has been reported for the first time for Himachal Pradeshfrom Baghi area of Shimla district, earlier reported from Jammu & Kashmir.

685. **Sud, Gunjan. 2016.** "*Zinnia peruviana* L. (Asteraceae) an overlooked species from Himachal Pradesh". *Indian Forester* 142(8): 795–796.

Abstract: *Zinnia peruviana* L. of the family Asteraceae has been reported for the first time for Himachal Pradesh from Shimla and Solan districts. Earlier this species was reported from Maharashtra and Karnataka.

686. **Sud, Gunjan. 2016.** "Additions to the family Asteraceae of Una district, Himachal Pradesh, India". *J. Econ. Taxon. Bot.* 40(1-2): 65–70.

Abstract: The study reports 19 species of Asteraceae as new records to Una district of Himachal Pradesh, India. The accepted name, relevant synonymy, short description and phenology are provided for each of these taxa.

687. **Trivedi, B.S., Aswal, B.S. & Mehrotra, B.N. 1981.** "New records of plants from Himachal Pradesh, India- II". *Indian J. Forest.* 4(4): 324–325.

Abstract: Eleven species belonging to 11 genera under 10 families have been recorded for the first time for the flora of Himachal Pradesh from Lahul valley in Lahul and Spiti district.

688. **Uniyal, B.P. 1986.** "Overlooked plant species of Himachal Pradesh–III. Species known from literature". *J. Econ. Taxon. Bot.* 8(2): 355–357.

Abstract: Following is the list of plants which are known to occur in Himachal Pradesh through published literature but have not been included in the Flora of Himachal Pradesh. The plants are arranged alphabetically and a reference to the literature is also given.

689. **Uniyal, B.P. & Malhotra, C.L. 1979.** "*Festuca arundinacea* Schreb. in India". *Bull. Bot. Surv. India* 21(1-4): 182.

Abstract: *Festuca arundinacea* Schreb. has been reported for the first time for India from Sholtu, Himachal Pradesh. This species previously known from most of the countries of Middle East extending to West Pakistan, Afghanistan, Central Asia, Japan and North Africa.

690. **Uniyal, B.P. & Mathur, R. 1991.** "*Lycium chinense* Mill. (Solanaceae) in northwest Himalaya". *Indian J. Forest.* 14: 79.

691. **Uniyal, B.P. & Mathur, R. 1991.** "Additions to the flora of Himachal Pradesh". *J. Econ. Taxon. Bot.* 15(2): 439–440.

Abstract: Four plants viz., *Lallemantia royleana* Benth. (Lamiaceae), *Lepyrodiclis tenera* Boiss. (Caryophyllaceae), *Moringa oleifera* Lamk. (Moringaceae) and *Pennisetum pedicellatum* Trin. (Poaceae) have been reported for the first time for the flora of Himachal Pradesh.

692. **Uniyal, B.P. & Murti, S.K. 1985.** "Some overlooked plant species of Himachal Pradesh". *J. Econ. Taxon. Bot.* 7(1): 240–242.

Abstract: In the present paper 51 plant species has been reported for the first time for the flora of Himachal Pradesh.

693. **Vaid, K.M. 1981.** "*Ranunculus lingua* L.– The 'Great Spear-Wort' naturalising in Kulu valley". *Indian J. Forest.* 4(2): 152–153.

Abstract: *Ranunculus lingua* L., the 'Great Spear-Wort' is essentially a European plant has been reported for the first time for the flora of Himachal Pradesh from Kulu valley. Earlier, in India this species was reported from Jammu and Kashmir.

694. **Vaid, K.M. & Naithani, H.B. 1970.** "C*otula australis* (Sieb.ex Spreng.) Hook. f.– A new record for the north-western and eastern Himalayas". *Indian Forester* 96(6): 426–428.

Abstract: C*otula australis* (Sieb. ex Spreng.) Hook. f., a Compositae, native of Australia and New Zealand, hitherto recorded from the south Indian hill stations is now reported to be naturalizing wet places in the Himalayas, presently in Kulu, Simla and Darjeeling. It appears to be a recent introduction in the Himalayan region, possibly, having come as an admixture with the imported food grains or even through sheep imported as breeding stock from Australia.

695. **Verma, J., Jaglan, Poonam, Thakur, K., Sharma, Kusum, Attri, L.K. & Vij, S.P. 2010.** "*Habenaria aitchisonii* Rechb.f. and *H. pubescens* Lindl. (Orchidaceae): New additions to the flora of Himachal Pradesh". *J. Orchid Soc. India* 24(1-2): 53–56.

Abstract: *Habenaria aitchisonii* Reichb. f. and *H. pubescens* Lindl., two species of ground growing orchids are recorded for the first time from Himachal Pradesh. Present report where suggests a continued distribution of the former species *(H. aitchisonii)* along the Himalayan range from Jammu and Kashmir eastward to Sikkim, it also validates an extended Northwestern Himalayan distribution of the latter one *(H. pubescens)* beyond Garhwal hills of Uttarakhand state. Both species are described and illustrated based upon their present collections from Himachal Pradesh.

696. **Vij, S.P. & Verma, J. 2007.** "*Gastrochilus* D. Don (Orchidaceae)– A new generic record for Himachal Pradesh". *J. Orchid Soc. India* 21(1-2): 19–21.

Abstract: *Gastrochilus* D. Don, a vandoid orchid genus, is reported for the first time from Himachal Pradesh, extending thereby its Northwestern limit of distribution in the Himalaya beyond Garhwal hills of Uttarakhand state. *Gastrochilus calceolaris* (J.E. Sm.) D. Don is the only species representing this genus in the state from Palampur. Descriptions and illustrations of the species are provided.

697. **Vij, S.P. & Verma, J. 2007.** "*Peristylis constrictus* (Lindl.) Lindl. (Orchidaceae): A new orchid record for Himachal Pradesh". *J. Orchid Soc. India* 21(1-2): 57–59 & *J. Econ. Taxon. Bot.* 31(2): 447–450.

Abstract: *Peristylis constrictus* (Lindl.) Lindl. is reported for the first time for Himachal Pradesh from Sanwara, Solan, extending thereby its North Western limit of distribution in the Himalaya beyond Garhwal region. Description of the species along with illustrations is provided.

698. **Viswanathan, M.V. & Sharma, J.P. 1983.** "Notes on *Portulaca pilosa* Linn. subsp. *pilosa* (Portulacaceae)". *J. Econ. Taxon. Bot.* 4: 289–290.

Abstract: *Portulaca pilosa* Linn. subsp. *pilosa* Geesink has been reported for the first time for Himachal Pradesh from Hamirpur district.

699. **Wadhwa, B.M. & Vohra, J.N. 1966.** "*Sphagnum squarrosum* Pers.– A new record for India". *Bull. Bot. Surv. India* 8(2): 197.

Abstract: *Sphagnum squarrosum* Pers. has been recorded for the first time for India from Kalpa, Himachal Pradesh. This taxon is widely distributed in Europe and North America and also known from Siberia and Japan, and is so far not reported from India.

Endemism, IUCN Threat Status and Conservation

700. **Badola, H.K. & Pal, M. 2002.** "Endangered medicinal plants species in Himachal Pradesh". *Curr. Sci.* 83(7): 797–798.

701. **Badola, H.K. & Pal, M. 2003.** "Threatened medicinal plants and their conservation in Himachal Himalayas". *Indian Forester* 129(1): 55–68.

Abstract: The paper analyses 133 rare, sensitive and threatened medicinal plant species of Himachal Himalayas for their status with the help of use pattern, nativity and endemism and explores possibilities for their conservation. These species constitute 17% trees, 23% shrubs and 60% herbs distributed over 59 families. The listed species include those that have been considered prone to endangerment or referred as endangered in literature and through experts' group exercises. These include 34% endemism (Indian Himalayan Region) of the total defined taxa in the paper. The above total assessed taxa show high nativity (>53%) to Himalayan region. A higher percentage of species (> 50%) under ethno-medicinal as well as commercially medicinal use category indicate high pressure on the same. Destructive nature of use pattern, i.e. root (60%), whole plant (16%), bark/wood/resin (19%) further indicates threats from harvesting. Special stress is made on 45 threatened species assessed under IUCN and other experts' criteria for Himachal Himalaya. Species prioritization using different exercises is given high value in wide scale conservation strategies, either by means of *in-situ* or *ex-situ* methods.

702. **Butola, J.S. & Badola, H.K. 2008.** "Threatened Himalayan medicinal plants and their conservation in Himachal Pradesh". *J. Trop. Med. Pl.* 9(1): 125–145.

Abstract: The present study was carried out on 17 high value threatened Himalayan medicinal plants namely *Aconitum heterophyllum, Angelica glauca, Arctium lappa, Bergenia ligulata, B. stracheyi, Dioscorea deltoidea, Hedychium spicatum, Heracleum candicans, Picrorhiza kurrooa, Podophyllum hexandrum, Polygonatum cirrhifolium, P. verticillatum, Rheum australe, Saussurea costus, Selinum tenuifolium, Thalictrum foliolosum and Valeriana jatamansi* to explore their availability in wild, market potential and cultivation performance in northwestern Himalaya, Himachal Pradesh, India. The propagation potential of wild and cultivated propagules were examined. This study unfolds economic value of the selected species, and suggests appropriate strategy for their conservation management.

703. **Chauhan, N.S. & Thakur, S. 1995.** "Conservation of plant genetic resources of Himachal Pradesh". *Indian J. Forest.* 18(3): 226–238.

Abstract: Himachal Pradesh, a hilly state situated in the North-West Himalayan region possesses a great diversity of plant life in its sub-tropical, temperate, alpine and cold

desert regions and has the elements of European, Chinese and Tibetian origin. It is considered a repository of medicinal herbs of Himalayan origin. Due to developmental activities like road construction, building of hydel projects, increase in horticultural activities coupled with the enormous biotic pressures, the forest genetic resources have been on the decline for many decades now. Exploitation of these resources also for economic gains and day to day use by the community in the absence of suitable measures for their protection, propagation and conservation has caused danger to the survival of many valuable species. There may be many such species which are feared to have disappeared without our knowing them. There is a global awakening now towards the conservation of plant genetic resources in particular and biological diversity in general. It calls for identifying the resources in totally, categorizing different endangered resources and devising means and measures for their conservation through Biosphere Reserves, Gene Sanctuaries, Botanical Gardens and Arboreta as well as in the National Parks. In the present paper, the forest genetic resources of Himachal Pradesh are highlighted, endangered species identified and both *in situ* and *ex situ* measures have been discussed.

704. **Goel, C.L. 1993.** "Conservation of medicinal plant resources in Himalayas (India)". *Indian Forester* 119(12): 970–976.

Abstract: The Himalayas are a rich source of medicinal plants which have generated tremendous scope of employment opportunities for local inhabitants apart from their role in health care system of the country and other socio-economic and environmental impacts on not only the local populations of these natural resources over several decades has brought us to the verge of loosing some of these precious heritage thereby also contributing to the general disintegration of our environment. The present article is an attempt to highlight the role these resources play in our daily life and national economy; the need to conserve these resources; and the strategies for such conservational actions at the national and individual level.

705. **Goraya, G.S., Pal, M., Kapoor, K.S. & Jishtu, V. 2008.** "Hill Bamboos - Socio-economic significance and conservation imperatives: A case study from Himachal Pradesh". *Indian Forester* 134(3): 351–362.

Abstract: Hill bamboos, locally called 'Nirgal', form a very important vegetation component in the Sutlej catchment falling under the Rampur Forest Division and Kotgarh Forest Division of Shimla district in Himachal Pradesh. Two species of this bamboo group *viz*. *Sinarundinaria falcata* and *Thamnocalamus spathiflorus* have been reported from these forest divisions. This paper, on the basis of empirical data, highlights the socio-economic significance of these bamboo species in the study area. Major threats to the wild populations of these species and conservation strategies for better management of this resource have also been discussed in this paper.

706. **Kala, C.P. 2000.** "Status and conservation of rare and endangered medicinal plants in the Indian Trans-Himalaya". *Biol. Conserv.* 93(1): 371–379.

Abstract: The author studied the distribution pattern, population structure and conservation status of rare and endangered medicinal plant species in Spiti sub-division of Himachal Pradesh in the Indian trans-Himalaya. The entire study area was stratified into six zones based on geomorphological and phytogeographical variations. In each zone different habitat types for rare and endangered species were identified and sampled using quadrats. A total of 23 rare and endangered medicinal plants were found in Spiti, distributed over 10 major habitat types. All the rare and endangered medicinal plants were localised and found in patches. The patch size for different species varied greatly from 1 to 20,000 m^2. There were large differences in the number of rare and endangered medicinal plant species within different zones of Spiti. More species of rare and endangered medicinal plants occurred close to the Great Himalayan range in the southern part of the study area. The highest mean density was estimated for *Picrorhiza kurrooa* followed by *Saussurea gnaphaloides*. The results are discussed in the light of rare and endangered medicinal plants conservation with the strong recommendation of the establishment of medicinal plants conservation areas in this part of trans-Himalaya.

707. **Kant, Ravi, Verma, J. & Thakur, K. 2012.** "Distribution pattern, survival threats and conservation of 'Astavarga' orchids in Himachal Pradesh, Northwest Himalaya". *Pl. Archives* 12(1): 165–168.

Abstract: All of the 4 orchid species used in 'Astavarga' group of Ayurvedic medicine, *Habenaria edgeworthii* Hook. f. ex Collett, *H. intermedia* D. Don, *Malaxis acuminata* D. Don and *M. muscifera* (Lindl.) Ktze. occur in Himachal Pradesh. These are distributed in temperate climates between 1800-2800 m altitudes and bloom during monsoon months. Illegal collection of the plant parts, shrinkage of natural habitats under the duress of expanding urbanization and grazing are main threats faced by orchid population in the state. Both *in situ* and *ex situ* conservation strategies are immediately required to ensure sustainable utilization of these therapeutically important herbs.

708. **Kumar, Puneet, Manikandan, R., Srivastava, S.K. & Panwar, G.S. 2016.** "Conservation status and uses of high altitude threatened medicinal plants, Himachal Pradesh". *Phytotaxonomy* 16: 115–121.

Abstract: Himachal Pradesh has a vast altitudinal range from 300 m to 7000 m asl, with varied habitats, species, populations, communities and ecosystems. More than 3400 species of angiosperms are reported in the state and over 1000 species have been documented as medicinal and aromatic in Shiwalik ranges, tropical and temperate forests and sub-alpine and alpine pastures for the states. Out of these, about 230

species of wild medicinal plants are recorded only in the high altitude regions of Himachal Pradesh. Of these, 44 species fall under critically endangered, endangered, vulnerable and endemic categories.

709. **Negi, S.P. 2018.** "Conservation status and agroforestry opportunity of commercially important medicinal plants of Himachal Pradesh". *Indian Forester* 144(4): 323–329.

Abstract: Himachal Pradesh situated in Indian Himalayan region is known for a rich floral and faunal diversity. The floral diversity of the state is famous for their medicinal value as local inhabitants have been traditionally using them for herbal remedies since ancient times. There are important medicinal plants which have high commercial worth and the locals have been harvesting them usually from the forests for trade so as to augment their revenue. The traders pay the prescribed permit fee to the Forest Department for trading these commercially important medicinal plants. However, unmanaged and destructive harvesting of these medicinal plants is putting tremendous pressure on forests, as forests are the primary source of these plants. Assessment of conservation status of these commercially important medicinal plants is important in order to safeguard them for continued benefits of these important plant species for human wellbeing. The global demand for medicinal plants will continue to rise and the best alternative to bridge the growing demand of commerce is cultivation that will not only help in in-situ conservation but also ensure continued supply of medicinal plants for our herbal medicinal requirements. Agroforestry offers a tremendous opportunity of producing many of these commercially important medicinal plants that will supplement income to the farmers in addition to the traditional crops grown on their farm. This paper discusses the medicinal species of commercially important plants with their status in Himachal Pradesh and opportunity to grow them in different agroforestry systems in the state.

710. **Negi, V.M. & Dutt, B. 2007.** "Status of threatened medicinal and aromatic plants of Sangla valley, district Kinnaur in Himachal Himalayas". *J. Ecol., Environm. & Conserv.* 13(1): 79–82.

Abstract: India is ranked sixth for having the largest number of threatened plant species. With the patronage of herbal medicines and their products increasing and establishment of various industries, there is urgent need to conserve the endemic diversity of medicinal and aromatic plants before it is wiped out from the nature, therefore the present study was carried out in Sangla valley of district Kinnaur to know the conservation assessment and present status of population existences of medicine and around plant. The present paper highlights the 5 critically endangered, 7 endangered and fourteen vulnerable species along with their botanical names, families, lifeforms, parts use and their IUCN status.

711. **Negi, V.M., Dutt, B. & Chauhan, N.S. 2007.** "Threatened medicinal and aromatic plants wealth of Sangla valley in Himachal Himalaya– Causes and remedies". *Int. J. Ecol. & Environm. Sci.* 33(2-3): 219–223.

712. **Rana, M.S. & Samant, S.S. 2010.** "Threat categorization and conservation of floristic diversity in the Indian Himalyan Region: A state of the art approach from Manali Wildlife Sanctuary". *J. Nature Conserv.* 18: 159–169.

Abstract: Strategies have been suggested by many conservationists to conserve biodiversity at regional, national and global levels. However, conservation strategies developed in the past were mostly based on qualitative attributes or one or two attributes. In the Himalayan region biodiversity varies from aspect to aspect, habitat to habitat and community to community therefore, location specific studies are required for its conservation and management. In the present study an approach has been developed to prioritise species at local level using six conservation attributes. Threat categorisation of the floristic diversity was undertaken based on Conservation Priority Index. Of the total 637 species of vascular plants recorded, 10 species were categorised as critically endangered; 15 species as endangered and 31 species as vulnerable. Two species as critically endangered, seven species as endangered and three species as vulnerable according to IUCN have been also recorded which indicated the importance of the sanctuary. Maximum threatened species were found in altitudinal zones 2000–2800 m and sites dominated by *Betula utilis* and *Rhododendron campanulatum* in forest and alpine zones, respectively. The two factors of over exploitation and habitat degradation have been identified as major threats to the floristic diversity. Therefore, monitoring of population and habitats, development of conventional protocol; establishment of species *in-situ* conditions and akin habitats and replication of this approach in other parts of Indian Himalayan Region have been suggested.

713. **Sharma, P. & Sharma, P.P. 2014.** "Floristic diversity and conservation status of native and endemic species in Murari Devi and surroundings area of Mandi district in Himachal Pradesh, Northwestern Himalaya". *Frontiers Biol. & Life Sci.* 2(2): 21–28.

714. **Sharma, P., Samant, S.S., Lal, M. & Sharma, A. 2014.** "Diversity, indigenous uses, threat categorization and conservation, prioritization of medicinal plants: A case study from Himachal Pradesh, India". *J. Biodiv. & Endangered Sp.* 2(4): 134.

Abstract: Mountains are among the most fragile environments on this planet. They are rich source of biodiversity, water, providers of ecosystem services on which downstream communities (both regional and global) rely. They are home to some of the world's most threatened and endemic species (including medicinal plants), as well as to some of the poorest people, who are dependent on the biological resources.

The worth of medicinal plants in regular healthcare practices provides clues to latest areas of research and in biodiversity conservation is now glowing. However, information on the uses of plants for medicine is deficient from interior areas of Himalaya. Keeping this in view, the present study has been conducted to study the diversity, indigenous uses, threat categorization and conservation prioritization of medicinal plants in Banjar Valley of Kullu district in Himachal Pradesh, North Western Himalaya. A total of 357 species of medicinal plants belonging to 98 families and 237 genera were recorded and used by the inhabitants of the area. These medicinal plants comprise of 27 trees, 269 herbs, 54 shrubs, 02 climber and 05 ferns. From the total, 193 medicinal plants were native, 03 endemic and 43 were near endemic. Highest medicinal plants were reported in the altitudinal zone, 2801-3600 and decreased with increasing or decreasing altitude in the study area. These species have been also analyze for their nativity, endemism, rarity and are prioritized for cultivation. An area-specific threat categorization of species is very essential for squat or long term management planning. In present study such an effort in the study area, using information on different attributes was initiated. The presence of critically endangered, endangered and vulnerable medicinal plants indicates high anthropogenic stress on these species. The over-exploitation, habitat degradation and changing environmental conditions may lead to the extinction within a few years. Therefore, regular monitoring of population and habitats, development of conventional protocol, establishment of species in-situ conditions and associated habitats and replication of this approach in other parts of Indian Himalayan Region have been recommended.

715. **Singh, P.B. & Aswal, B.S. 1994.** "Conservation and cultivation of medicinal plants in Himachal Pradesh, India". *J. Econ. Taxon. Bot.* 18(3): 715–722.

Abstract: In recent years the demand of medicinal plants, which constitute bulk of the raw material required for manufacturing drugs of our indigenous systems of medicine, homeopathy and certain allopathic drugs have increased rapidly. To meet out this increasing demand, over exploitation of medicinal plants combined with deforestation and other biotic interferences have resulted in fast depletion of our natural resources and extinction of several precious species from their natural home. Therefore, to maintain a balance between this growing demand and supply and to save these medicinal plants from extinction, conservation and cultivation seems to be the only alternative. State with its wide ranging climate, topography, rainfall and rich fertile soil can be converted into a drug house for whole of the country with sincere thought and efforts in this direction. Based on author's personal experiences and survey work carried out by Regional Research Centre (Ayurved), Mandi (H.P.), a list of medicinal plants which need immediate attention for their conservation and cultivation in Himachal Pradesh, has been prepared and presented in this article.

716. **Srivastava, S.K. 2002.** "Threatened taxa of *Jasminum* L. in India". *Phytotaxonomy* 2: 94–99.

Abstract: *Jasminum* L. is represented in India by 49 species mainly distributed in Himalayas, Deccan Peninsula and Andaman & Nicobar Islands. 16 species are endemic to India. Of these, eight are rare and considered to be endangered, as they have not been recorded, after their type collection. *Jasminum parkeri* Dunn has endemic to Chamba, Himachal Pradesh. This paper gives taxonomic details of eight threatened species, emphasing their conservation status, type localities and future strategies for undertaking conservation measures.

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717. **Aggarwal, A., Parkash, V., Sharma, D. & Sharma, S. 2004.** "Ethnobotanical studies on some wild plants of lower hills of Himachal Pradesh". *Appl. Bot. Abst.* 24(2): 136.

718. **Ahluwalia, K.S. 1952.** "Medicinal plants of Kangra valley". *Indian Forester* 78(4): 188–194.

Abstract: In the present paper a list 46 medicinal plants has been given from which the drugs were extracted in the Kangra valley. A list has also given on medicinal plants which control the blood pressure with their chemical constituents.

719. **Ahmad, M., Sharma, Alpy, Prakash, Om. & Uniyal, S.K. 2017.** "Folk utilization of plants in Kugti: An interior village of Chamba (Himachal Pradesh)". *J. Non-Timber Forest Prod.* 24(1): 7–19.

Abstract: The study documents palnt species used by the residents of Kugti an interior Himalayan village, through observations and interviews. Forty four plant species belonging to 32 families were being used as edible, medicine, dye, magico-religious, socio-cultural and starter purposes. Use of *Plectranthus rugosus, Wikstroemia canescens, Vincetoxicum hirundinaria* and *Angelica glauca* are unique to the area.

720. **Arora, A., Sharma, M. & Gupta, S. 2018.** "Ethnomedicinal studies of some tree species of Chamba district (Himachal Pradesh), India". *Ann. Pl. Sci.* 7(2): 2056–2062.

Abstract: The present study encompasses 121 ethno-medicinal uses of 26 tree species of 20 families deployed for 75 maladies and 16 body systems as included in WHO-ICD 11 by Gaddi and Gurjar tribes of Chamba region (Himachal Pradesh). Tribal's were more familiar to therapeutic plants used for digestive disorders i.e. 24 use reports of 16 tree species followed by skin maladies and localized infections. No citation regarding immune system, circulatory, sensory systems, mental, behavioral/ neuro-developmental disorders, sleep-wake disorders, conditions related to sexual health and injury, poisoning or certain other consequences of external causes was obtained. *Taxus baccata* was found to be most versatile species of the region as it was deployed in 13 diseases of 8 body systems.

721. **Arora, R.K., Maheshwari, M.L., Chandel, K.P.S. & Gupta, R. 1980.** "Mano (*Inula racemosa*): Little known aromatic plant of Lahul valley, India". *Econ. Bot.* 34(2): 175–180.

Abstract: Among the 20 species of Inula (Compositae) occurring wild in India, five are considered to be of economic value. Of these, *Inula racemosa* has gained some prominence as a medicinal and aromatic plant, and is now grown on a small scale in Lahaul valley in northwestern Himalaya. The domesticated forms of this incipient cultigen have been selected by the natives from the wild types which occur amongst stony, alpine scrub vegetation in this cold arid habitat between 2,700-3,500 m. The fragrant aromatic roots of this plant are likely to find a place in natural perfumery materials. Accordingly, information on this alpine perennial herb, based on personal observations and published accounts (Wealth of India, 1959) is presented here to highlight its importance as a new, industrial raw material of the future. It fetches higher prices than the traditionally-grown kuth (*Saussurea lappa*) roots in this tract because of superior odour.

722. **Arya, V, Bhardwaj, A. & Sharma, V. 2011.** "Pharmacology of some antioxidant plants from district Kangra Himachal Pradesh–- A Review". *Int. J. Curr. Pharmaceut. Res.* 3(2): 26-–31.

Abstract: Medicinally important plants having antioxidant potential are needed for formulating various herbal drugs and thus can be used for curing diseases. The present review deals with a list of antioxidant plants found in Kangra district of Himachal Pradesh, a Northern State in India which is located in the Western Himalayas which based on information collected from most relevant data available. The present paper deals with the pharmacological aspects of these antioxidant plants including dose administered, pharmacological screening models and mechanism involved in antioxidant activity.

723. **Arya, V., Thakur, R. & Kashyap, C.P. 2012.** "Ethnomedicinal flora of Kangra valley of Himachal Pradesh, India". *Recent Advances Pharmaceut. Sci. Res.* 1(2): 15–29.

Abstract: An ethnomedicinal survey was carried out in Kangra valley of Himachal Pradesh for documentation of important flora and information from local community about their medicinal uses. The indigenous knowledge of local traditional uses was collected through questionnaire and personal interviews during field trips. Plants with their correct nomenclature were arranged by family name, vernacular name, parts uses, ethnomedicinal remedies and uses. The identification and nomenclature of listed plants were based on the Flora of India. A total of 72 plants species were identified by taxonomical description and locally by ethnomedicinal knowledge of people existing in the region.

724. **Aswal, B.S. & Mehrotra, B.N. 1987.** Ethnobotanical studies on the flora of Lahul valley (North-West Himalayas). In: Sharma, M.R. & Gupta, B.K. (Eds.), *Recent Advances in Plant Sciences*. Bishen Singh Mahendra Pal Singh, Dehra Dun, Pp. 116–130.

725. **Badola, H.K. 2001.** Medicinal plant diversity of Himachal Pradesh. In: Samant, S.S., Dhar, U. & Palni, L.M.S. (eds.), *Himalayan Medicinal Plants: Potential and Prospects*. Gyanodaya Prakashan, Nainital. Pp. 87–116.

726. **Badola, H.K. & Butola, J.S. 2003.** "Cultivation production trials of *Heracleum candicans*, a threatened high value medicinal herb, in Himachal Himalaya". *Umbellifereae Improvement Newsletter*, USA 13: 6–10.

727. **Bahar, N. 2002.** "Some medicinal plants of Cold Desert". *Indian Forester* 128(4): 465–469.

Abstract: Several species commonly growing in cold desert are used by local people for various purposes. 25 important medicinal plants along with family, common name, plant parts used and used in disorders are mentioned in the present paper.

728. **Bhardwaj, A., Rani, S. & Rana, J.C. 2014.** "Traditionally used common fibre plants in outer Seraj area, Himachal Pradesh". *Indian J. Nat. Prod. & Resources* 5(2): 190–194.

Abstract: An ethonobotanical study was conducted to document the traditional use of fibre yielding plants used by the indigenous people of Outer Siraj area of district Kullu of Himachal Pradesh. Personal interviews and group discussions were conducted to gather information on the indigenous knowledge. A checklist of 'categories of plant use' was developed and used to identify, categorize and document fibre plant species in the area. The ethnobotanical fabrics/ articles, viz. Pula, Mandri of this region are rich in traditional practices and people living in the Outer Siraj area of Himachal Pradesh, India use natural fibre plants in various ways for their subsistence. Fifteen plants were identified as most commonly used fibre plants belonging to 10 families of which family Poaceae and Urticaceae are most important. 67.00% of fibre is obtained from stem and bark. *Cannabis sativa* L. is used by 92.19% people followed by *Grewia optiva* Drumm. (76.56%). *Euphorbia royleana* Boiss. is the least used fibre plant (1.56%). New ethnobotanical uses of *Agave cantula* Roxb. and *Urtica dioica* L. are reported for the first time.

729. **Bhardwaj, J. & Seth, M.K. 2017.** "Medicinal plant resources of Bilaspur, Hamirpur and Una districts of Himachal Pradesh: an ethnobotanical enumeration". *J. Med. Pl. Stud.* 5(5): 99–110.

Abstract: An ethno-botanical exploration of tropical areas of Himachal Pradesh (Bilaspur, Hamirpur and Una) was carried out to enumerate few imperative medicinal plant species used by the inhabitant to cure different ailments. Presence of 135 plant species out of which 133 angiosperms, 1 gymnosperm (*Pinus roxburghii* Sargent.) and 1 fern (*Adiantum incisum* Forssk.) were documented. 135 plant species belonging to 116 genera and 63 families found to be used by inhabitant for remedial purposes.

Amongst 135 plant species (41) flowers, (49) fruits, (77) roots, (84) leaves, (47) seeds, (2) rhizomes, (6) latex, (6) kernels, (10) stems, (2) shoots, (62) bark, (14) whole plant were considered to be utilized for treatment of various diseases by local communities.

730. **Bhardwaj, M., Chauhan, N.S. & Kak, Anjali. 2011.** "Dye yielding plants of Himachal Pradesh". *J. Econ. Taxon. Bot.* 35(2): 429–432.

Abstract: The increasing market demand for dyes and the dwindling number of dye yielding plants forced the emergence of synthetic dyes. But, research has shown than synthetic dyes are suspected to release harmful chemicals that are allergic, carcinogenic and detrimental to human-health. Therefore, it becomes essential to search for naturally occurring dye yielding plants. Dye yielding plants from various parts of the country have been documented. However, no such information is available from Himachal Pradesh. In the present communication an attempt has been made to document from Himachal Pradesh.

731. **Bhardwaj, M., Chauhan, N.S. & Pandey, A. 2014.** "Folk medicinal plants from Kinnaur region of Himachal Pradesh, India". *Indian Forester* 140(7): 715–720.

Abstract: An ethnobotanical survey was carried out to collect information on the available genetic resource of medical plants of the Kinnaura schedule tribes of Himachal Pradesh, India. A total of 49 species belonging to 412 genera and 27 families were reported as being used locally for the treatment of human ailment. Out of these 25 species belong to different threat categories and have already entered the list of Red Data Book. Kinnaura tribes have a strong faith on these traditional phytotherapies and the loss of endangered status of these plants will affect the health care practices of these tribes to a great extent. Hence, there is an urgent need for sustainable harvest and conservation of these valuable resources. The conservation based on indigenous knowledge is recommended.

732. **Bhondge, S.W., Jishtu, V. & Bhushan, B. 2018.** "Indigenous traditional knowledge of wild medicinal plants of Rupin Valley, Himachal Pradesh". *Indian Forester* 144(11): 1087–1093.

Abstract: Rupin valley is situated in remote region of Shimla district, Himachal Pradesh. The valley has a rich repository of medicinal and aromatic plants (MAPs). In the present investigation, an attempt has been made to explore the indigenous traditional knowledge (ITK) of medicinal plants and the healthcare system used for the betterment in the valley i.e. Dodra-Kwar Tehsil. In this study frequent field trips were made for the collection of the plant specimens as well as information on medicinal aspects from local healers and the elder people through questionnaire and interviews. The knowledge of medicinal plant, parts used, mode of administration and local name was also recorded with interviews. Ethnobotanical surveys were conducted across

the different villages of Rupin valley during the year 2014 and 2015. The present study has resulted in the documentation of 55 different medicinal plant species belonging to 33 families and 46 genera.

733. **Bisht, A. & Jain, S.P. 2006.** "Review of ethnobotanical studies of genus *Rubus* (Rosaceae) from North-Western Himalayas". *Ethnobotany* 18: 127–130.

Abstract: Ethnobotanical uses of 15 species of the genus *Rubus* from North Western Himalayas are discussed based on survey and consultation of published literature. The study reveals that *Rubus ellipticus* and *R. pedunculosus* are commercially cultivated in some parts of India, because they have industrial significance; the rest of the species are used by various tribals and local communities for treating different diseases in teh area under study.

734. **Bodh, Monika, Samant, S.S., Tewari, L.M. & Kumar, Vijay. 2017.** "Diversity, distribution pattern, indigenous uses and conservation of the economically important floristic diversity in Shikari Devi Wildlife Sanctuary, North Western Himalaya, India". *J. Non-Timber Forest Prod.* 24(2): 109–126.

Abstract: The present paper is an attempt to assess the ethnobotanical floristic diversity of Shikari Devi Wildlife Sanctuary, located in Mandi district of Himachal Pradesh. Two species, viz., *Pimpinella acuminata* and *Scrophularia himalensis* were found endemic to the Indian Himalayan Region.

735. **Bodh, Monika, Samant, S.S., Tewari, L.M. & Kumar, Vijay. 2019.** "Diversity, endemism and indigenous uses of wild edible plants of Shikari Devi Wildlife Sanctuary in Himachal Pradesh, North Western Himalaya, India". *Indian Forester* 145(1): 62–69.

Abstract: The rural communities living in the mountainous region of the Himalaya are largely dependent upon the forest resources for their day to day needs. Among these, wild edibles plants form the important component of food items of the inhabitants. In view of this an attempt has been made to assess the diversity, distribution pattern, nativity and endemism of wild edible plants of Shikari Devi Wildlife Sanctuary in Mandi district of Himachal Pradesh, North Western Himalaya. Total 71 wild edible plants belonging to 38 families and 55 genera were recorded based on extensive and intensive surveys and interviews of the local knowledgeable people. Different parts of the plants were utilized, of which fruit (35), followed by leaves (16), seeds (12) and roots (08) were used the maximum. 39 species natives, 30 spp. non-natives and 20 near endemics were recorded between 1800-2800 m. Besides, information on the other uses of the wild edible plants was also collected. The study on the quantitative assessment of wild edible plants is necessary to identify the potential values, develop propogation protocols, and investigations of neutraceuticals and establish them in *ex-situ* and *in-situ* conditions, which would help in raising the economy of the natives living in the Himalaya.

736. **Boktapa, N.R. & Sharma, A.K. 2010.** "Wild medicinal plants used by local communities of Manali, Himachal Pradesh, India". *Ethnobot. Leafl.* 14: 259–267.

Abstract: An ethnobotanical study was carried out in adjoining areas of Manali in Kullu district of Himachal Pradesh during the month of April to May 2007. The information related to medicinal species which are used to cure common ailments and diseases were gathered by personal interviews with village headmen, local healers, and shepherds. A total of 33 plants belonging to 24 families are listed in this paper. Details of medicinal plants are described alphabetically with their botanical name, family, local name, part used, disease/ailment and ethno medicinal uses.

737. **Brahmi, M.K. & Dutt, B. 2014.** "Factors affecting cultivation of medicinal and aromatic plants in Rampur block of district Shimla in Himachal Pradesh". *Indian Forester* 140(8): 786–788.

Abstract: The study examined the various factors affecting cultivation of medicinal and aromatic plants (MAPs) in Rampur block of district Shimla in Himachal Pradesh by surveying of 213 farmers (61 female and 152 male) in January, 2010. The findings revealed that a total 10 factors were perceived by the farmers which pose hindrance in the cultivation of MAPs in the area. These factors were ranked as: Lack of awareness about medicinal and aromatic plants, lack of knowledge about cultivation practices, lack of marketing awareness, non availability of local market, subsidy culture, lack of training and visit programme, lack of demonstration of modern technologies, lack of value addition knowledge and facilities, no storage facilities, migration of people to urban areas for wages. Therefore it is recommended that the policies and programmes emphasis on these factors will gear up the cultivation of medicinal and aromatic plants in these areas.

738. **Chand, R., Kaur, R., Kaur, A., Kumar, V., Nirmala, C. & Singh, A.N. 2016.** "Assessment of ethnobotanical plant diversity of Una and Hamirpur district of Himachal Pradesh, India: An ethno-ecological approach". *Ann. Pl. Sci.* 5(12): 1475–1489.

Abstract: The present study was conducted to explore ethnobotanical diversity and importance of local plants harnessing for medicinal purposes by the local people of Una and Hamirpur district, Himachal Pradesh, India. We recorded in total 159 plant species of 138 genera belonging to 68 families to cure more than 33 different types of ailments. Across family-wise distribution, most important useful plants were recorded from ten families: Asteraceae, Euphorbiaceae, Fabaceae, Acanthaceae, Ceaselpiniaceae, Moraceae, Solanaceae followed by Annonaceae, Convolvulaceae and Liliaceae. These families accounted 43.7% of the total plants and exhibited most acclimatized within local environmental conditions. However, of the total recorded plants revealed as herbs contributed the major proportion (50 %) followed by trees (29%), shrubs (11%), climber (9%), creeper and khumb (<1% each). It was observed

that most utilized plant parts were leaves recorded from 55 plant species to cure different ailments followed by other components viz: whole plant (43), bark and seed (34 species each), root and fruits (32 each), flower (18) and other remaining were stem shoot, bulb, rhizome and tubers, respectively. In general, people living to the adjoining areas of the forests have direct influence to utilize those local plants for different ailments; therefore, they have good practices and vast knowledge of traditional uses. Hence, aim of the present study was to collect information about ethno-medicinal plants which were not clearly documented earlier in the literature as well as to investigate the plant-human interactions to understand the socio-ecological relationships.

739. **Chandrasekar, K. 2007.** "Newly recorded ethnomedicinal plants from Pin valley National Park, Himachal Pradesh". *J. Non-Timber Forest Prod.* 14(4): 261–264.

Abstract: Newly recorded 31 ethnomedicinal plants from Pin valley National Park, Himachal Pradesh are enumerated with their correct binomials including family name, uses with combinations, mode of preparation and dosage.

740. **Chandrasekar, K. & Srivastava, S.K. 2003.** "Ethnomedicinal studies in Pin valley National Park, Lahaul-Spiti, Himachal Pradesh". *Ethnobotany* 15: 44–47.

Abstract: The communication deals with ethnomedicinal information on Amchi system of medicine gathered from Pin Valley National Park, Himachal Pradesh in respect of 35 species of angiosperms. Their local names, uses in different ailments, mode of preparation and dosage of plant product have been given.

741. **Chandrasekar, K. & Srivastava, S.K. 2005.** "New reports on aphrodisiac plants from Pin valley National Park, Himachal Pradesh". *Ethnobotany* 17: 189–190.

Abstract: Information about four plants used as aphrodisiac by the tribals of Pin Valley National Park, Lahaul-Spiti in Himachal Pradesh is provided along with their mode of preparation and dosage.

742. **Chandrasekar, K. & Srivastava, S.K. 2005.** "Traditional uses of plants in curing jaundice in the Pin Valley National Park, Himachal Pradesh". *Indian J. Tradit. Knowl.* 4(3): 314–316.

Abstract: The paper provides traditional uses of few plant species in curing jaundice by the local community residing in and around Pin Valley National Park, Lahaul & Spiti in Himachal Pradesh. Their uses along with the dosages and combination with other plants are provided.

743. **Chauhan, Joginder, Negi, A.K., Rajasekaran, A. & Pala, N.A. 2013.** "Wild edible plants as emerging ethnomedicines from the Kinnaur district of Himachal Pradesh, India". *J. Non-Timber Forest Prod.* 20(4): 273–280.

Abstract: The present investigation provides information on wild edible plants with potential medicinal values from the Kinnaur district, Himachal Pradesh. Informed consent

semi-structured interviews from 179 inhabitants of seventeen villages from three blocks were conducted to collect the research data. A total of thirty three ethno-medicinal wild edible plants belonging to nineteen families and twenty five genera were documented. Of these, twenty one were herbs, nine shrubs and three tree species. *Prunus armenica* and *Zanthoxylum armatum* were most significant ethno-medicinal wild edible plant species and these species still have importance among the people of the region. Many other wild edible plants such as *Ephedra gerardiana, Podophyllum hexandrum, Berberis* sp., *Bergenia ciliata, B. stracheyi, Rheum australe, R. webbianum* species though considered medicinal but are not used for this purposes and edible parts of these species are simply regarded as supplementary food. The practice of using wild edible plants still exists among the rural populations of Kinnaur district, but is vanishing fast. Consequently, the recording, preserving and documentation of this traditional knowledge to future generationis essential.

744. **Chauhan, N.S. 1974.** "Medicinal plants of Una forest division, Una district (H.P.), lying in Shiwalik range". *Nagarjun* 27: 31–39.

745. **Chauhan, N.S. 1988.** Ethnobotanical study of medicinal plants of Himachal Pradesh. In: Kaushik, P. (Ed.), *Indigenous Medicinal Plants*. Today & Tomorrow Printers & Publishers, New Delhi. Pp. 187–198.

746. **Chauhan, N.S. 1989.** "Potential of aromatic plants flora in Himachal Pradesh". *Indian Perfumer* 33(2): 118–122.

747. **Chauhan, N.S. 1990.** "Medicinal orchids of Himachal Pradesh". *J. Orchid Soc. India* 4(1, 2): 99–105.

Abstract: Therapeutic and ethnobotanically important orchid species of Himachal Pradesh are briefly described in this paper. Information is also provided on their common names, distribution and medicinal utility.

748. **Chauhan, N.S. 1992.** *Commercial Medicinal and Aromatic Plants of Himachal Pradesh (Illustrated)*. State Council for Science, Technology and Environment, Govt. of Himachal Pradesh.

749. **Chauhan, N.S. 1997.** *Ecological and ethnobotanical studies on the flora of Spiti, Himachal Pradesh.* Ph. D. Thesis. Dept. of Bio-sciences, Himachal Pradesh University, Shimla, Himachal Pradesh (Unpublished).

750. **Chauhan, N.S. 1999.** *Medicinal and Aromatic Plants of Himachal Pradesh*. Indus Publishing Company, New Delhi.

Abstract: The present book highlighted the most important medicinal and aromatic plant resources of Himachal Pradesh. More than 700 species of medicinal and aromatic plants have been covered in the book of which only 175 medicinal and aromatic plants have been selected for detailed description covering latin name (based on

current nomenclature), local/common name(s), family, distribution in the state specifying the actual locality supported by voucher numbers, description of plant with special emphasis on official parts, preparations in Ayurvedic medicines, main chemical ingradients, uses, retail market price (wherever possible) cultivation notes and harvesting instructions.

751. **Chauhan, N.S. 2003.** "Important medicinal and aromatic plants of Himachal Pradesh". *Indian Forester* 129(8): 979–998.

Abstract: Himachal Pradesh, situated in the lap of the western Himalayas, is considered a veritable emporium of medicinal and aromatic plants having diverse agro-climatic conditions ranging from semi-tropical to temperate, alpine and culminating into the cold desert region. Out of around 3500 species more than 1000 species have been documented as medicinal and aromatic for the state occurring in Shiwalik ranges temperate forests, valley areas, sub-alpine and alpine pastures (both moist and dry). Himachal Pradesh is the largest supplier of Atish, Salampanja, Dhoop, Kutki, Bankakri, Chora, Daruhaldi, Talispatra, Revandchini, Vach and Somlata in the country. The entire pressure is on the wild populations and only a few crops like Kuth, Kalazeera, Kesar, Hops are cultivated in Lahul-Spiti and Kinnaur. The present paper highlights 179 species of commercial importance for drugs and phyto-pharmaceuticals; 32 species yielding essential oils; 16 species utilised for manufacturing of dhoop and incense; 30 species as source of phyto-chemicals; 40 species useful for tans and dyes and 42 species which can be used as potent substitute for exotic species, thereby discouraging their import and saving foreign exchange reserve. It is suggested that the herbal resources of the State should be scientifically documented, commercial cultivation initiated compiled with value addition for ushering in economic prosperity to the people of this hill state.

752. **Chauhan, N.S. & Khosla, P.K. 1988.** Ethnobotanical studies as medicinal plant of Himachal Pradesh. In: Kaushik, P. (Ed.), *Indigenous Medicinal Plants*. Today & Tomorrow's Printers & Publishers, New Delhi, Pp. 197–198.

753. **Chauhan, O.S. & Gupta, B.K. 1996.** "Medicinal plants of Chopal tehsil of Shimla district (H.P.)". *J. Non-Timber Forest Prod.* 3(1/2): 74–77.

Abstract: this paper records 26 medicinal plant from Chopal tehsil of Shimla district, Himachal Pradesh along with their local names, altitudinal ranges of occurrence and the part/parts used in the treatment of various diseases.

754. **Chauhan, P.P., Nigam, A. & Santvan, V.K. 2014.** "Ethnobotanical survey of trees in Pabbar valley, distt. Shimla, Himachal Pradesh". *Life Sci. Leafl.* 52: 24–39.

Abstract: Present study was carried out to document the ethnobotanical knowledge of local people about trees of Pabbar Valley in Himachal Pradesh. Indigenous

knowledge of local inhabitants about the use of native plants was collected during field visits through semi structured questionnaire and interview method. In this paper a list of 34 plants belonging to 14 families has been presented. This paper explores the uses of trees by indigenous people for various purposes; Timber, fruit, fodder, fuel, medicine, religious and agricultural tools. The ethnobotanical studies on herbaceous plants of the area are available, but little work has been done to document the trees. The present work is compilation of information gathered through field survey, plant collected, identified and mounted on herbarium sheets. Photographs of plants were also taken.

755. **Chauhan, P.P., Nigam, A. & Santvan, V.K. 2016.** "Ethnobotanical study of wild fruits in Pabbar valley, district Shimla, Himachal Pradesh". *J. Med. Pl. Stud.* 4(2): 216–220.

Abstract: Wild fruits are widely consumed in rural Himalayas and are potential source of various compounds and are also used in folk medicines. A study of wild fruits as eatable of Pabbar valley was carried out with the aim of documentation, identification and exploration of the ethnobotanical knowledge of local people. Total 33 plants species have been collected and they were arranged alphabetically with Botanical name, family vernacular name, habit, fruiting and flowering season and folk use. Free listing, individual interviews and direct observations were used to gather information. The plants were collected, identified and mounted on herbarium sheets. The indigenous knowledge that exists about wild edible plants could be used for their conservation and further cultivation in the area for human consumption. Photographs of some selected plants have been provided.

756. **Chauhan, V. & Chauhan, N.S. 1986.** "Ethnobotany of Trans-giri area of Sirmour district of Himachal Pradesh". *Bull. Med.-Ethno-Bot. Res.* 9(3-4): 19–22; 9(3-4): 106–122.

757. **Devi, Usha, Seth, M.K., Sharma, P. & Rana, J.C. 2013.** "Study on ethnomedicinal plants of Kibber Wildlife Sanctuary: A cold desert in Trans Himalaya, India". *J. Med. Pl. Res.* 7(47): 3400–3419.

Abstract: The present study aimed to document the use of ethnomedicinal plants by Bodh or Bhotia tribe residing around Kibber Wildlife Sanctuary, a cold desert protected area in trans Himalayan Region. First-hand information on traditional knowledge was collected from Amchis (Folk healers) and local knowledgeable people of age groups that are between 30 and 75 years along with thorough review of previous studies in Indian Himalayan Region. Informants citations were also recorded for various ailments for which the species were used by which authenticity of the uses made can be assessed. The study provides information on the indigenous uses of 69 plant species, which are distributed among 25 families and 54 genera, that is, Angiosperms (24

families, 53 genera and 68 species), Gymnosperms (1 family, 1 genus and 2 species). Out of the total plants, 65 were herbs and four were shrubs.

758. **Dobriyal, R.M., Singh, G.S., Rao, K.S. & Saxena, K.G. 1997.** "Medicinal plant resources in Chhakinal watershed in North-Western Himalaya". *J. Herbs Spices & Med. Pl.* 5(1): 15–27.

Abstract: Traditional knowledge, uses, monetary costs, and benefits associated with medicinal plants were analyzed in the Chhakinal watershed of Northwestern Himalaya. Of 29 plant species used in folk medicine, only 3 species, *Juglans regia, Picrorrhiza kurrooa*, and *Morchella esculenta* were noted to have market value. The medicinal value of four species, *Dioscorea deltoidea, Podophyllum hexandrum, Valeriana jatamansi*, and *Jurinea macrocephala*, were unknown to local people, but sold for cash income. Use of medicinal plants in the traditional health care system of the area varied, depending upon the species and ailment. A total of 11 species were used for disorders related to digestive system, six species were used for skin infections, and three species were used for joint or muscular pain. The medicinal plants grew in government owned forests and other uncultivated lands as constituents of natural vegetation. Alpine vegetation had the greatest number of medicinal plant species, while forests had the greatest density of medicinal plants. Medicinal plants contributed 1.29 percent of annual cash income of an average household in the watershed.

759. **Dogra, K.S., Kumar, R., Kumar, Suresh & Sharma, Romita. 2017.** "Ethnic plants used in funeral pyre and need for their conservation in Himahal Pradesh". *J. Non-Timber Forest Prod.* 24(1): 33-37.

Abstract: Ethnobotanical studies are mostly concerned with the uses of plants for disease control, food, fodder or for any other daily uses by the habitants of the area. There have been very little preferences given in the past to document the plants used for various ritual ceremonies involved in the human's life from their birth to death. The present study is a way forward in this direction and documented about 34 plant species belonging to 16 families, which are associated with funeral pyre and other related ceremonies in Himachal Pradesh. Also the information of plant species regarding their botanical name, vernacular name, family, habit, ecology, reproductive cycle and folk uses associated with funeral pyre also documented.

760. **Dutt, B. & Negi, V.M. 2007.** "Species composition, diversity and distribution pattern of medicinal and aromatic plants of Sangla valley in Himachal Hills". *Indian J. Ecol.* 34(1):19.

761. **Dutt, B., Nath, D., Chauhan, N.S., Sharma, K.R. & Sharma, S.S. 2014.** "Ethno-medicinal plant resources of tribal Pangi valley in district Chamba, Himachal Pradesh, India". *Int. J. Bio-resour. & Stress Manage.* 5(3): 416–421.

Abstract: Ethnobotanical studies provide helpful clues for crop domestication and folk selection for better utilization of resources to meet local needs. The rural folks and tribals in India even today depend largely on the local herbal resources for curing different types of diseases. The present study was undertaken to assess the ethno medicinal uses of plants by the tribal people of remote tribal Pangi valley of Himachal Pradesh, revealed 45 plant species belonging to 20 different families having ethno medicinal value. The information on ethno medicinal uses of plants was collected through interviews, questionnaires, direct observations and also by consulting local elderly people, Gujjars or Gaddies and Vaids. The local people believe in the efficacy of these herbs along with some divine power, but the knowledge is restricted to very few elderly folks only. Therefore, this valuable information needs to be systematically collected, documented and preserved so that it can serve the mankind in generation to come and will also act as an important tool in conserving and preserving the traditional usages of these precious plant resources of high economic value. The collected information has been documented and presented in the current study.

762. **Dutt, B., Negi, V.M., Hanief, S.M., Thakur, Shalu & Bhardwaj, Pawan Kumar. 2007.** "Phytosociological studies of medicinal and aromatic plants of selected sites of Sangla valley in Himachal Himalaya". *J. Ecol., Environm. & Conserv.* 13(3): 487–491.

Abstract: The present investigation was undertaken to characterize the floristic composition, vegetation diversity and distribution pattern of medicinal and aromatic plants at different altitudinal zones of Sangla valley in Himachal Pradesh. The study revealed that the important value Index (IVI) of different species varies from site to site. The most represented herb species were *Achillea millefolium, Pimpinella diversifolia and Achillea millefolium and Cotoneaster bacillaris* were recorded as most represented shrub species at site I, II and III respectively. Majority of herb species exhibited contiguous distribution pattern, followed by random distribution pattern. Whereas, most of the shrub species showed random distribution pattern followed by the Contiguous distribution pattern.

763. **Dutt, B., Sharma, S.S., Sharma, K.R., Gupta, A. & Singh, H. 2011. "**Ethnobotanical survey of plants used by Gaddi tribe of Bharmour area in Himachal Pradesh". *ENVIS Newsletter: Himal. Ecol.* 19: 22–27.

764. **Gaur, R.D. & Singh, P.B. 1993.** "Ethnomedicinal plants of Mandi district, Himachal Pradesh". *Bull. Med.-Ethno-Bot. Res.* 14(1-2): 1–11.

765. **Gautam, Ajay Kumar & Bhadauria, R. 2008.** "A preliminary survey on ethnomedicinal flora of Bilaspur district, Himachal Pradesh (India)". *Environm. Biol. & Conserv.* 13: 49–51.

766. **Gautam, Ajay Kumar & Bhadauria, R. 2009.** "Homeopathic flora of Bilaspur District of Himachal Pradesh, India: A Preliminary Survey". *Ethnobot. Leafl.* 13: 123–130.

Abstract: The present study was made in nine villages of Bilaspur district of Himachal Pradesh, a north Indian state known for its vast herbal flora. About 23 plant species belonging to 18 families used in the homeopathic system of medicine are highlighted in the present study along with their taxonomic description including botanical name, medicine name, plant part used and ailment against which the medicines are used. The collected plant specimens were identified, taxonomically defined and submitted to the herbarium for future records.

767. **Gautam, Ajay Kumar, Bhatia, M.K. & Bhaduaria, R. 2011.** "Diversity and usage custom of plants of south western Himachal Pradesh, India– Part I". *J. Phytol.* 3(2): 24–36.

Abstract: The present study reports the diversity of plant resources of Bilaspur district of Himachal Pradesh, India for their medicinal, traditional and edible uses. Total 98 plant species belonging to 51 different families were documented for their multifarious uses through collecting information by means of questionnaire surveys, participatory observations and field visits. Of total plant species, 44.89% of tree, 38.77% herb and 16.32% shrub were recorded. About 70.40% plants were used in medicinal practices whereas, 38.77% in traditional and 34.69% in edible purposes. The use of above ground parts like leaves (37.75%), fruits and seeds (20.40% each) and other aerial parts, stem, branch, flowers/inflorescence (12.24-3.06%), was found to be higher as compare underground parts include roots, bulb and rhizome (8.16%). About 10 types of diseases related to stomach, mouth, cough, cold, skin, blood, vitality & strength, bones, muscles, and other like memory, swelling etc. were found to be cured by plant based medicines. Use of young twigs was higher (39.47%) in different traditional activities as compare to other plant parts such as, leaves (23.68%), timber (10.51% each) and fruit, bark, spine, powder, latex/resin, seed and stem (23.68% collectively). It was observed that urbanization posing a threat to the plant diversity of the area as well traditional knowledge and cultural practices of the rural peoples.

768. **Guleria, Vipan & Vasishth, Amol. 2009.** "Ethnobotanical uses of wild medicinal plants by Guddi and Gujjar tribes of Himachal Pradesh". *Ethnobot. Leafl.* 13: 158–167.

Abstract: India is a rich source of plant flora of 2500 documented species and 600-700 species are having medicinal value. About 150 are used commercially. It is reported that Western Himalayas are the abode of 50 percent plant drugs mentioned in the British pharmacopoeia. Medicinal plants are used for preventive, promotive and curative purposes. Eighty percent of the ingredients of drug formulation in Ayurvedic are plant based. In compliance with the CBD and WTO, India too has to conserve its natural resources from unfair exploitation. The survey of the area was conducted during March, 2007-October, 2008. The two tribal communities viz. Gaddis

and Gujjars were interviewed. These two nomadic communities were asked to identify the plant and tell its use by them. The samples of the plants were crosschecked with the qualified ayurvedic practitioners of the area and some were identified by the author himself. However, some of the samples were processed and identified with the help of literature available in the library of Dr. Y.S. Parmar University of Horticulture and forestry, Nauni, Solan. The plant species of the area have been enumerated below in an alphabetic order. Each species have been provided with scientific name, local name, crude drug preparation (as per details provided by the folklore) and its local use. Twenty seven species of ethnobotanical use were identified from this backward district of Himachal Pradesh.

769. **Gupta, H. 1998**. *Comparative studies on the medicinal and aromatic flora of Churdhar and Rohtang areas of Himachal Pradesh*. M. Sc. Thesis. Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan (unpublished).

770. **Gupta, M.P. 1988.** "Present status and future prospects for the cultivation and collection of medicinal plants of Himachal Pradesh". *Indian Forester* 114(1): 19–25.

Abstract: An attempt has been made to describe the present state of affairs with respect to the exploitation of medicinal plants in Himachal Pradesh. A case has been made out for standardizing package of practices for the collection, processing, marketing etc. of the important medicinal plants. Suggestions for taking up cultivation in forest areas and popularization of high yielding strains by carrying out genetic study has been made.

771. **Gupta, P. & Sharma, V.K. 2013.** "Reckoning the ethnobotanical wisdom of communities living in the lower Sutlej basin of Himachal Himalayas". *Life Sci. Leaflets* 3(3): 55-69.

Abstract: The study was carried out to access the ethno-botanical wisdom of communities living in the lower Sutlej Basin of Himachal Himalayas. In order to gather the requisite information, an ethno-botanical survey was undertaken by making use of pre-designed schedules and interviews during field trips in the study area, besides, other standard methods of getting and analysing ethno-botanical information. A total of sixty six plants including, shrubs (23 species), trees (26 species) herbs (11 species), grasses (4 species) and climbers (2 species) were enumerated. In addition to the use of plants for medicinal purposes, the enlisted plants were utilized for rituals and magico-religious purpose (34.8%), hedging and fencing (9%), edibles (24.2%) fodder (19.6%), fuel (27.2%) and manure (4.5%). The families Urticaceae had five species and Compositae, Euphorbiaceae, Leguminosae, Rosaceae, Poaceae had three each species, respectively. The area is under an impending threat of the construction of a dam on river Sutlej, which is likely to affect not only the flora, fauna and ecology but is also posing threats to social life and cultural legacy of the river basin. The study concluded that natives inhabiting the basin possess rich ethno-botanical knowledge, which needs

to be conserved. The survey allows for recognizing several valuable herbal plants, indicating highly prospective for profitable growth through their sustainable utilization.

772. **Gupta, R. 1962.** "Medicinal plants of West Himalayas". *J. Agric. Trop. Bot. Appl.* 9: 1–54.

773. **Gupta, R. 1964.** "Survey record of medicinal and aromatic plants of Chamba Forest Division of H.P.". *Indian Forester* 90(7): 454–468.

Abstract: The survey reports brings on record of 155 medicinal and aromatic plant species, of which only 40 are known to possess constant market demand. Because of constant exploitation of drugs from these areas without providing protection of regeneration, etc. Steps should now be taken to bring extraction of drug and aromatic plants on systematic and scientific lines before these areas are completely exhausted.

774. **Gupta, R. 1968.** "Medicinal and aromatic plants of Bhandal range, Churah Forest Division, Chamba district, Himachal Pradesh". *J. Bombay Nat. Hist. Soc.* 68(3): 791–803.

Abstract: A systematic survey of Bhandal Forest Range of Chural Forest Division, Chamba district, Himachal Pradesh reveals that some 15 plant species are regularly exploited in varying quantities for export outside the district; an additional 44 species are collected on a limited scale either on orders from outside or for local use. The edapho-climatic conditions available in the district are suitable for commercial cultivation of a large number of drugs and perfumery raw materials, which continue to be imported into the country.

775. **Hamid, A. & Raina, A.K. 2014.** "Ethnobotacical uses of plants in and around Kanji Wildlife Sanctuary, North West Himalaya". *Int. J. Sci. & Res.* 3(11): 538–545.

Abstract: Ethno botanical enumeration of plants in and around of Kanji Wildlife Sanctuary, Kargil, North West Himalaya revealed 30 non-cultivated plant species belonging to 29 genera and 23 families that are being used by the inhabitants of the area. Plant part used dominantly are 'aerial part' (9 spp.), followed by 'flowers' (4 spp.), 'whole plant' (4 spp.), 'flowers and stem' (2 spp.), 'fruits and stem' (2 spp.) and 'leaves and stem' (2 spp.). Of the 30 species, 12 species are used as fodder, 7 species as fuel, 5 species as vegetable, 15 species for medicinal purpose while 17 species are being used for miscellaneous purposes. Most of the species belonged to Asteraceae (5 spp.) followed by Fabaceae (3 spp.) and Rosaceae (2 spp.). A number of factors like grazing and unscientific exploitation among others have rendered the plants as threatened. The plant resources can be conserved by employing sustainable management practices involving all stakeholders, especially the local communities.

776. **Jain, S.P. & Puri, H.S. 1994.** "An ethno-medico-botanical survey of Parbati valley in Himachal Pradesh (India)". *J. Econ. Taxon. Bot.* 18(2): 321–327.

Abstract: The study was carried out in Parbati valley in Himachal Pradesh, on the traditional use of plants for curing various human diseases. Thirty seven local plant species used for treating various diseases were collected, identified and voucher specimens have been deposited in the herbarium of Central Institute of Medicinal and Aromatic Plants (CIMAP). Their medicinal use and mode of administration of the drugs are also described wherever possible.

777. **Joshi, V.K., Kumar, A. & Thakur, N.S. 2015.** "Technology of preparation and consumption pattern of traditionally alcoholic beverage 'Sur' of Himachal Pradesh". *Int. J. Food & Fermentation Technol. 5*(1): 75–82.

Abstract: A survey of 'Sur' production in Himachal Pradesh (India) was conducted and reported. Sur is a traditional alcoholic beverage produced in many parts of Himachal using finger millet *(Eleucine corcana*) as a basic raw material. A crisp review of the survey revealed that the Suris known by various local names in the different regions. Knowledge regarding preparation and consumption pattern of Sur was collected by carrying out a survey in Kullu, Kangra, Mandi and Sirmaur districts of Himachal Pradesh. The fermentation is carried out mostly in the earthen pots and these were sterilized by the smoke produced by burning jaggery and 'dhaeli' inside the pots and retaining the smoke for some time. Its fermentation is carried out by using a traditional inoculums "dhaeli" which is a mixture of roasted barley with several herbs with natural micro-flora. It is madefrom barley, weighed from 250 gm to 1 Kg, yellow in color and need 1-2 to months for preparation. The fermentation is generally carried out in the traditional earthen wares which takes about 7-8 days in summers and 12-15 days in winters to complete. The method of preparation though varied in different districts surveyed. Based on the information collected, a general flow sheet for the process was developed and reported here. The product also has social and religious significance. It is offered to the local deities and is served in the social gatherings like marriages, funerals and other religious ceremonies. As it makes use of the several herbs it is also supposed to have medicinal properties. It is usually consumed in the un-distilled form. The beverage is regarded as a tonic by the elders and is most popular among them. However, a decreased trend of sur consumption was found among the youngsters as they had shifted to other commercially available beverages in the market.

778. **Kala, C.P. 2006.** "Medicinal plants of the high altitude cold desert in India: Diversity, distribution and traditional uses". *Int. J. Bio. Sci. & Manage.* 2(1): 43–56.

Abstract: Distribution patterns and traditional uses of medicinal plant species were studied in the high-altitude cold desert of India (Indian trans-Himalaya), with the help of indigenous medical practitioners (locally called *amchis*). Unstructured and semi-structured questionnaire surveys were conducted with 83 *amchis* living in Ladakh and

Lahaul-Spiti. To study the distribution pattern of medicinal plants, 70 sub-localities were surveyed and grouped into 8 broad localities. A total of 335 medicinal plant species were recorded, of which 45 were rare and endangered. The main plant part used in preparing medicine was the leaf, followed by the flower, root, shoot, seed and fruit. The distribution pattern of the medicinal plants was, generally, localized because most (27%) were restricted to marshy and moist areas, followed by dry scrub (13%), rocks (12%), boulders (10%) and undulating land or alpine meadows (9%). Within the study area, the highest numbers of rare and medicinal plants were found in the Pin valley, followed by the Zanskar valley and the Leh valley. Factors related to conservation and management of medicinal plants in the cold desert of India are discussed.

779. **Kala, C.P. & Manjrekar, N. 1999.** "Ethno-medicobotany of Indian trans-Himalaya: A case study from Spiti". *J. Econ. Taxon. Bot.* 23(1): 177–183.

Abstract: The paper deals with ethno-medicinal uses of 62 plant species occurring in Spiti sub-division of Lahaul-Spiti district, Himachal Pradesh. The local herbal practitioners in this part of trans-Himalaya are called as *Amchis* who have occupied a rich knowledge of herbal use for medicine. Due to remoteness of the area and its cut off from rest of the state in major part of the year, people still depend on the age old herbal system of medicine which is called as Tibetan system of medicine. There is an urgent need to document and protect this rich and valuable traditional knowledge.

780. **Kanwar, P. & Sharma, N. 2011.** "Traditional pre- and post natal dietary practices prevalent in Kangra district of Himachal Pradesh". *Indian J. Tradit. Knowl.* 10(2): 339–343.

Abstract: Rural women constitute a storehouse of traditional knowledge. The paper attempts to present a rich variety of traditional foods served to the rural women specifically at pre- and post-natal stage. The traditional knowledge was documented from rural women using questionnaire based survey along with focused group discussion with key informants, local health workers and aged rural women. The information pertaining to ingredients used, method of preparation, frequency of consumption and logic behind consumption of these food preparations were recorded. The dietary practices followed by the local people at pre- and post-natal stages are based on different concepts. At the initial prenatal stage, to check abortion, *seera* is served as it is considered to possess cooling effect, while during ninth month, dietary practices emphasize on improving digestion and appetite, and provide energy to bear the stress of delivery. Decoctions and mixtures of herbs that can provide strength and stimulate the uterine contractions to aid in comfortable delivery are given at the time of labour pains. At post natal stage, food preparations like *kharani, sund* and *moong dal halwa* are served which are nourishing, provide energy and

increase lactation. Since, the knowledge has been passed on from generation to generation orally; understanding and documentation of such knowledge can help to conserve the dying wisdom.

781. **Kanwar, P. & Yadav, D. 2005.** "Indigenous animal health care practices of Kangra district, Himachal Pradesh". *Indian J. Tradit. Knowl.* 4(2): 164–168.

Abstract: Indigenous technical knowledge in animal healthcare practices was documented in the Kangra district of Himachal Pradesh by using participatory rural appraisal technique (PRA). Among the documented indigenous practices, foot and mouth disease, diarrhoea, tympany, cold, fever, skin diseases, conjunctivitis, wound and eaten placenta were primarily treated with medicinal plants along with other materials available with the farmers. In the opinion of the experts, these practices could be recommended as they have some scientific rationale. However, practices applied for hemorrhagic septicemia, indigestion, tail necrosis, dislocation of joints and horn fracture, were doubtful for recommendations.

782. **Kanwar, P., Rekha, A. & Roy, S. 2006.** "Ethno-veterinary practices: An appraisal of rural women's wisdom in Himachal Pradesh". *Asian Agri. Hist.* 10(1): 75–82.

Abstract: Rural women constitute a storehouse of indigenous knowledge by virtue of their accumulated experiences and practices. This knowledge is unique to their culture and ecosystem, and it largely gets dispersed in a social system through interpersonal communication. It is, therefore, necessary for the scientific community to adequately document and validate this knowledge so that it merges with the scientific stream of knowledge. This paper attempts to document and scientifically validate the ethno-veterinary practices used by rural women for dairy herd management in Himachal Pradesh, in northern India. These practices were primarily applied in the treatment of digestive disorders, reproductive disorders, ailments, and other miscellaneous diseases. Most of the practices were based on plant sources for which the scientific validation was carried out on the basis of their pharmacological and pharmaceutical status. Some of the scientifically validated practices were found to be worth recommending for curing the commonly occurring ailments in the hilly state of Himachal Pradesh.

783. **Kanwar, P., Sharma, N. & Rekha, A. 2006.** "Medicinal plants use in traditional healthcare systems prevalent in western Himalayas". *Indian J. Tradit. Knowl.* 5(3): 300–309.

Abstract: The present research work was carried out in six villages of Kangra district of Himachal Pradesh to study application of plants at home scale level in treating various kinds of ailments. The information was documented using questionnaire and PRA techniques with the help of village elders, key informants and local healers. In the present study, thirty-one plant species used by the villagers for the treatment of various diseases at home scale level were identified. Twenty plant species were used

for curing more than one disease. Three plants, *Aloe barbadensis* Mill., *Asparagus racemosus* Roxb. and *Tinospora cordifolia* Willd. were used against more than five diseases. It was found that elder people had more inclination towards herbal medicines followed by middle and young people. Since the knowledge of various medicinal plants being used in herbal treatment and their method of use is confined to mostly local healers, it is of utmost importance to record this knowledge for future generations, otherwise, it will be lost forever.

784. **Kanwar, S.S., Gupta, M.K., Katoch, C., & Kanwar, P. 2010.** "Cereal based traditional alcoholic beverages of Lahaul and Spiti area of Himachal Pradesh". *Indian J. Tradit. Knowl.* 10(2): 251–257.

Abstract: Some cereal based traditional alcoholic beverages, *Chhang, Lugari, Aara* and *Chiang* consumed by people of Lahaul and Spiti area of Himachal Pradesh were documented and explored microbiologically. All these beverages were made by cooking their grains and then inoculating them with inocula called *Phab/ Dhaeli*. Chemical analysis of these products showed an acidic nature with *p*H in the range of 3.31-4.02 in undistilled samples, and 3.95-5.17 in distilled samples. Total soluble solids in all the undistilled samples were in the range of 14.58 to 18.56°B, whereas in distilled samples these were in the range of 7.19-8.0°B. Ethanol contents (%v/v) were 5-12% in undistilled and 13-19% in distilled products. A wide variation in certain other chemicals constituents', viz. acetaldehyde, methanol, ester, n-propanol, etc. was observed in the distilled alcoholic beverages. Microbiological examination of these beverages and their source of inocula revealed the dominance of yeasts mainly from genus *Saccharomyces* and *Endomyces*. Bacteria encountered in these beverages were from genus *Lactobacillus, Acetobacter,* and *Bacillus*.

785. **Kanwar, S.S., Gupta, M.K., Katoch, C., Kumar, R. & Kanwar, P. 2007.** "Traditional fermented foods of Lahaul and Spiti area of Himachal Pradesh". *Indian J. Tradit. Knowl.* 6(1): 42–45.

Abstract: Some traditional fermented foods consumed by people of Lahaul and Spiti area of Himachal Pradesh were explored microbiologically and documented. Chilra, Jhan chang, Babru, Bhaturu and Seera were the main food products made from cereals. These products were prepared by using traditional/ natural inoculum, i.e. khameer/malera or phab as a starter culture. All the fermented foods were acidic in nature. Microbiological examination of these food products and their source of inoculum revealed the dominance of yeasts mainly from genera Saccharomyces, Debaromyces and Schizosaccharomyces. The bacteria were mainly from the genera *Lactobacillus, Lactococcus,* and *Leuconostoc*.

786. **Kapahi, B.K. 1990.** "Ethno-botanical investigations in Lahaul (Himachal Pradesh)". *J. Econ. Taxon. Bot.* 14(1): 49–55.

Abstract: During the course of exploration of ethno-botanical wealth of Lahaul Forest Division, the author has collected about fifty folk-lore claims from local inhabitants, belonging to thirty families. The botanical names of the plants, local names, part used and modes of their administration are enumerated.

787. **Kapoor, A., Kanwar, P. & Gupta, R. 2010.** "Traditional recipes of district Kangra of Himachal Pradesh". *Indian J. Tradit. Knowl.* 9(2): 282–288.

Abstract: Himachal Pradesh, a hilly state, has lot of variation in recipes prepared by local people. The communication deals with traditional recipes of district Kangra as per seasonal availability of plant material. Although food habits of local people have changed these days, still they relish the local preparations. Participatory Rural Appraisal techniques were used for documentation of required information. The plant material used by the people for recipes included its leaves, flowers, stem, fruits and root. The period of availability of raw material ranged from 1-3 months approximately. Various traditional recipes prepared especially from leaves of plants, viz. *Colocasia*, fig, basil, pigweed, buck wheat, and water cress are very good source of calcium, phosphorous and iron. These recipes are loosing its sheen in the fast-food culture. So, there is a need to conserve our traditional food recipes as the plant material used for these is completely organic thus nutritious and healthy /safe to eat.

788. **Kapur, S.K. 1993.** "Ethno-medico plants of Kangra valley (Himachal Pradesh)". *J. Econ. Taxon. Bot.* 17(2): 395–408.

Abstract: A total of 136 plant species of medicinal importance occurring in the vicinity of Kangra valley of Himachal Pradesh used by Kangiris and local physicians have been enumerated in the present communication.

789. **Kaur, D. & Singhal, V.K. 2016.** "Chromosome counts, male meiotic studies and ethnobotanical uses in selected medicinal herbs from Kinnaur district of Himachal Pradesh (India)". *World J. Pharm. & Pharmaceut.* Sci. 5: 912–395.

Abstract: Chromosome counts and detailed male meiotic studies have been made on locally used medicinal herbs from Kinnaur district, Himachal Pradesh. Five species, *Clematis graveolens* (n=8), *Astragalus strobiliferous* (n=8), *Lonicera hypholeuca* (n=9), *Saussurea albescens* (n=17) and *Elaeagnus parvifolia* (n=9) have been counted chromosomally for the first time at world level. Additional/variant chromosome counts/ cytotypes have been reported for *Thalictrum foetidicum* (n=21, 6x), *Geranium pratense* (n=28, 4x), *Oenothera glazioviana* (n=14, 4x) and *Hipphophae salicifolia* (n=9, 2x). Chromosome counts have been made for the first time from India for 12 species. Present studies also adds the first ever report of diploid/polyploid cytotypes for *Geranium wallichianum* (n=14, 2x), *Indigofera heterantha* (n=8, 2x), *Trigonella emodii* (n=8, 2x), *Plantago depressa* (n=6, 2x), *Rumex nepalensis* (n=50, 10x), *Capparis spinosa* (n=12, 2x), and *Physochlaina praealta* (n=21, 2x). All the species have been

studied cytologically for the first time from study area. Of the 82 species included for present studies, the leaves and whole plant is used for curing various ailments compared to other plant parts. The herbs are taken in the form of decoction, extracts, paste, juices and in the powdered form to cure various ailments such as gastric disorders asthma, cholera, diabetes, constipation, cold, cough, fever, pneumonia, jaundice, cardiac and skin problems, pain, headache, toothache and body ache.

790. **Kaur, I., Sharma, S. & Lal, S. 2011.** "Ethnomedicinal survey of medicinal plants used for different diseases in Mandi District, Himachal Pradesh". *Int. J. Res. Pharm. & Chem.* 1(4): 1167–1171.

Abstract: Man has always made use of medicinal plants to cure sufferings and diseases. This review documented information on the various therapeutic applications of plants used in traditional medicine. As the rural folk and old aged peoples have long been using plants for their various ailments but these information related traditional medicinal uses of plants are not well documented. There is an urgent need for documenting these folklore and traditional knowledge in some form before such valuable knowledge becomes inaccessible and extinct.

791. **Kaur, M., Singhal, V.K. & Singh, J. 2017.** "Use of some ethnomedicinal herbs by the natives of Solang valley, Kullu district, Himachal Pradesh". *Int. J. Pharm. & Pharmaceut. Sci.* 9(9): 222–227.

Abstract: The objective of the study was to enlist the ethnobotanical uses of wild plants of Solang Valley, Kullu District, Himachal Pardesh. Due to the specific geographical location of the valley, it possesses a high amount of endemic plant diversity. The plants are being used medically by local people against many ailments such as rheumatism, gastric disorders, muscular pain, asthma, dysentery, diabetes, constipation, cold, cough, fever, etc.

792. **Kharwal, A.D. & Rawat, D.S. 2009.** "Ethnobotanical studies on timber resource of Himachal Pradesh (H.P.), India". *Ethnobot. Leafl.* 13: 1148–1157.

Abstract: Timber is one of the most important resources in the life of ethnic communities and villagers. Timber resources are used by the ethnic communities and the villagers for various purposes *i*.e. house construction, furniture, and agricultural implements; for making walking sticks, musical instruments and packing cases etc. Timber is the most important forest resource along with shelter, food and clothes used by any community in Himachal Pradesh as well as in any part of the country and it has contributed a lot in the development of various civilizations from time immortal. This paper deals with the 61 timber resources of H.P. belonging to 47 genera and 26 families as well as their various uses by the ethnic communities and villagers. The timber resources have been divided in all the three ranges of Himachal Himalayas.

793. **Kharwal, A.D. & Rawat, D.S. 2012.** "Ethnobotanical notes on indigenous herbal shampoos of Shivalik hills, Himachal Pradesh, (India)". *Pl. Sci. Feed* 2(6): 88–90.

794. **Koelz, W.N. 1979.** "Notes on the ethnobotany of Lahaul, a province of the Punjab". *Quart. J. Crude Drug Res.* 17: 1–56.

795. **Kumar, Ashish, Samant, S.S., Tewari, L.M. & Paul, Shiv. 2018.** "Diversity, distribution, indigenous uses and conservation of economically important plants in Kalatop-Khajjiar Wildlife Sanctuary, Chamba district, Himachal Pradesh, India". *J. Non-Timber Forest Prod.* 25(2): 107–126.

Abstract: The present study was conducted on diversity, distribution, indigenous uses and conservation of economically important plants in Kalatop-Khajjiar Wildlife Sanctuary, Chamba district, Himachal Pradesh during 2013-2016 which has not been explored so far. A total of 361 economically important species (33 trees, 70 shrubs, 249 herbs and 9 ferns) belonging to 254 genera and 99 families have been recorded. These species are used for medicinal (229 spp.), edible (78 spp.), fodder (15 spp.), fuel (53 spp.), timber (9 spp.), religious (20 spp.) and other species for various other purposes. Of the total species, 150 are native, 211 non-native, 73 near endemic and 1 endemic. These species are distributed between 1870-2750 m. amsl. Due to habitat degradation, over exploitation and changing environmental conditions, the populations of most of the species are facing threats. Therefore, frequent monitoring of populations of these species in relation to climate change and education and awareness among the local inhabitants and Forest Department officials are suggested.

796. **Kumar, Ashish, Samant, S.S., Tewari, L.M. & Paul, Shiv. 2019.** "Diversity, distribution and utilization pattern of medicinal plants in Kalatop-Khajjiar Wildlife Sanctuary of Chamba district, Himachal Pradesh, India". *Int. J. Med. Photon* 106: 218–242.

Abstract: Most of the protected areas in Himachal Pradesh are unexplored or under explored. The Kalatop-Khajjiar Wildlife Sanctuary in Chamba district, Himachal Pradesh has not been explored for the medicinal plants diversity. Therefore, the present study was conducted to explore the medicinal plants diversity of the sanctuary during 2013-2016 and recorded 239 medicinal plants (19 trees, 38 shrubs, 173 herbs and 09 ferns) belonging to 185 genera and 85 families. Of the recorded medicinal plants, 101were natives, 23 near endemic and 01 endemic (i.e., *Scrophularia himalensis* Royle ex Benth.). Different parts of the medicinal plants were used by the inhabitats for curing cough, cold, fever, cuts, wound, blood purification, tonic, liver and kidney complaints, antidote to snake, insect bite, etc. But, due to over exploitation, habitat degradation and changing environmental conditions, the populations of most of the species are decreasing rapidly in the sanctuary. Therefore, there is an urgent need to monitor the populations of these medicinal plants frequently by using ecological

(quardrat) method, and create awareness among the inhabitants and Forest Department officials about the sustainable utilization.

797. **Kumar, G. & Chander, H. 2018**. "Ethno-veterinary and fodder plants of Awah-Devi region of Hamirpur district, Himachal Pradesh". *J. Biol. Chem. Chron.* 4(1): 8–15.

Abstract: The present study was conducted in Awah-Devi region of district Hamirpur (Himachal Pradesh) to accumulate traditional knowledge regarding diversity and availability of fodder and ethno-veterinarian plant resources for livestock. Survey questionnaire, participatory observations and field visits were conducted to illicit information. Information on locality, mode of use and seasonal availability was recorded by interviewing the people of studied villages. Fifty four species of fodder plants including trees, shrubs and herbs have been recorded during the present investigation. Out of these, eleven fodder plant species (*Acacia fistula, Brassica nigra, Brasssica compestris, Butea monosperma, Carissa opaca, Cissamplos pareira, Cynodon dactylon, Eclipta prostrata, Ficus palmata, Grewia optiva* and *Ziziphus mauritiana*) are also used traditionally for treatment of various livestock ailments.

798. **Kumar, Gulsan & Duggal, Sampy. 2019.** "Ethnobotanical wisdom among the *Koratas* and *Hindu-Gujjar* tribes in Dharampur region of Mandi district, Himachal Pradesh, India". *Biol. Forum- An Int. J.* 11(1): 156–171.

Abstract: The present paper deals with the documentation of field observations on traditional use of medicinal and aromatic plants by the inhabitants of area of Dharampur region of Mandi district of Himachal Pradesh in North-Western Himalaya. These hills range are inhabited by different ethnic groups including two main tribes, Kiratas and Hindu-Gujjars. These inhabitants have been dependent directly on the plant resources for food, fuel, fiber, timber, household articles and medicines to a great extent for ages. A large number of plants of local flora are used to cure various ailments of human and livestock. First hand information about 88 plants from Dharampur region belonging to 42 families were recorded by conducting extensive field surveys during February to September, 2018. The information is represented in a tabulated form as scientific names of plants followed by family in alphabetic order and collected as herb, shrub and tree. Information on vernacular names of plants, parts used and diseases treated are given in detail. The highest number of ethno-medicinal plants was recorded from the family Brassicaceae and Cucurbitaceae (8 species) followed by Leguminosae (5 species) and Rutaceae, Moraceae and Poaceae (4 species) and Apiaceae, Lamiaceae and Solanaceae, (3species). Leaves (48%) were the most frequently used plant part used to treat various ailments followed by whole plant (16%) and roots/rhizomes (16%). A wide range of diseases ranging from cough and cold to asthma and bronchitis, and cuts and wounds to snakebites are treated by the traditional healers of Dharampur region of Mandi district with the help of local plant

remedies. This study documents valuable information for traditional remedies and contributes to the usage of medicinal plants in the research area.

799. **Kumar, Gulsan & Duggal, Sampy. 2019.** "Ethnomedicinal diversity of aromatic plants in foot hill regions of Himachal Pradesh, India". *Int. J. Theoretical & Appl. Sci.* 11(1): 18–39.

Abstract: The ethno botanically different aromatic plants and plant parts are used as food, medicine, fodder, dye for festivals, rituals and various other functions. Comparatively, information pertaining to ethnomedicinal practices is scanty for Western Himalaya in general. Hence, an attempt has been made to document the precious information on the usage of wild as well as cultivated plants from foot hill regions of Himachal Pradesh with a view regards of its utilization as edible, medicinal and aromatic plants. The extensive survey was conducted in four selected districts viz., Una, Hamirpur, Bilaspur and Mandi respectively. Interviews were conducted through stratified questionnaire prepared for local people. Out of hundred plants, 19% leaves, 17% seeds, 14% fruits & roots, 13% flowers & bark, 4% whole plant & stem, 1% bulbs & rhizomes of plant species are used for the treatment of various diseases. Documentation, preservation and recording of medicinally important plant species and traditional knowledge associated with the use of local plant species should be necessary step for the conservation of plant species and traditional knowledge associated with them for future generation.

800. **Kumar, Gulshan & Rana, Sanya. 2018.** "Indigenous ethnomedicinal practices of Jahu valley region of Himachal Pradesh, India". *CPUH Res. J.* 3(2): 106–115.

Abstract: Plants are the basis of life and play a vital role in our livelihood. A present study was carried out in nine villages surrounding the Jahu valley region of Himachal Pradesh to enumerate medicinal plant species used to cure different kinds of ailments. The people of these areas have a great traditional knowledge about the local plants used for the treatment of various diseases. An ethno botanical survey was undertaken in study area to collect information related to medicinal plants for the treatment of various diseases. The information was obtained through questionnaire, face to face interviews of the herbal experts 'Vaidyas' and local inhabitants. The study reveals that many people of this region depend upon the local plants for their primary health care. This study also reveals that several medicinal plants are decline in number due to destruction of their habitats, unscientific collection of plants and poor post harvest methods. Hence, there is a need of conservation of local ethno-medicinal plants in order to use the traditional knowledge for future generations.

801. **Kumar, Gulsan, Thakur, Khushbu, Kumar, Vishal & Jyoti. 2018.** "Some overlooked ethno-medicinal plants of district Bilaspur, Himachal Pradesh". *Int. J. Engineering Pure & Appl. Sci.* 3(2): 87–94.

Abstract: This paper shows the importance of medicinal plants in traditional healthcare practices, providing clues to new areas of research and in biodiversity conservation is now well recognized. This survey was made in nine villages of Bilaspur district of Himachal Pradesh, a north Indian state known for its vast herbal flora. The study aimed to look into the diversity of plant resources that are used by local herbal experts for curing various ailments. Questionnaire surveys, participatory observations and field visits were planned to illicit information on the uses of various plants. About 50 plant species belonging to 18 families used in the homeopathic system of medicine are highlighted in the present study along with their taxonomic description including botanical name, vernacular name, plant parts used and ailment against which the medicines are used. The collected plant specimens are identified, taxonomically defined and submitted to the herbarium for future records.

802. **Kumar, H., Kumar, R. & Chand, A. 2012.** "Ethnomedicinal uses of plants of Chhota and Bara Bhangal areas of district Kangra, Himachal Pradesh". *Ethnobotany* 24: 126–131.

Abstract: Ethnomedicinal information on 51 plant species was recorded during the extensive field survey carried out in Chhota and Bara Bhangal areas of district Kangra, Himachal Pradesh during 2008-2009. The information covers botanical names, vernacular names, family, plant parts used and the mode of usages. A special fusion called *Chhachha* is made by *Bhangalis*, which is used as a panacea by these people, is being documented for the first time. The present study was undertaken with the sole objective of documenting the traditional uses of medicinal plants of the area.

803. **Kumar, K., Singh, K.K., Asthana, A.K. & Nath, V. 2008.** "Ethnotherapeutics of bryophyte *Plagiochasma appendiculatum* among the Gaddi tribes of Kangra Valley, Himachal Pradesh, India". *Pharmaceut. Biol.* 38(5): 353–356.

Abstract: The use of thalloid liverwort *Plagiochasma appendiculatum* Lehm. et. Lind. By Gaddi tribes of Kangra Valley, Himachal Pradesh in India, for the cure of burns, boils, and blisters of skin is reported for the first time.

804. **Kumar, M. & Sharma, B. 2014.** "Commonly used medicinal plants in tehsil Baijnath, district Kangra, Himachal Pradesh, India". *Res. in Pharm.* 4(5): 11–15.

Abstract: Himachal Pradesh is located in Western Himalaya, is a store house of medicinal plants. Plants are used to treat various ailments with magico-religious beliefs in all civilizations. Baijnath is located in the lap of Dhauladhar range in district of Kangra, Himachal Pradesh. Most of the population lives in villages and use various plants for their basic needs such as food, fodder, wood and to treat various diseases. Till date no study was undertaken to document the commonly growing medicinal plants used in villages of Baijnath tehsil. Hence, the study was undertaken and well documented. Study reveals that local healer and villagers use 55 plants which are common and belong to 37 families and 49 genera.

805. **Kumar, Nilay & Chauhan, N.S. 2007.** "Ethnobotanical studies of Nahan area, district Sirmour, Himachal Pradesh". *J. Non-Timber Forest Prod.* 14(4): 307–312.

Abstract: The present paper highlights 55 plant species of ethnobotanical importance to Nahan area, district Sirmaur (Himachal Pradesh). Ethnobotanically, the area remains unexplored and no comprehensive account of local traditional knowledge is available. The importance of recording the usage of plants in this region is especially imperative because of rapid loss of forest wealth and traditional wisdom. The local names, part being used and application/ingestion, botanical names along with their proper identification of 55 plats have been presented in this paper.

806. **Kumar, N. 2004.** "Studies on the distribution and importance of medicinal and aromatic plants of Nahan area, district Sirmaur (H.P.)". M. Sc. Thesis. Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan (unpublished).

807. **Kumar, N. 2014.** "Some plants used as cardiac stimulants, blood purifiers, purgative and antispasmodics in Unani system of medicine from Joginder Nagar (H.P.)". *Indian J. Fundamental. & Appl. Life Sci.* 4(2): 427–432.

Abstract: Himachal Pradesh is one of the richest biodiversity states of India due to variable environmental conditions. By population explosion dependency on biodiversity has increased many folds and some species of plants are at the edge of extinction due to over exploitation and habitat destruction. The present study was carried out to assess and document the floristic diversity of Tehsil Joginder Nagar. During the course of investigations, 59 plant species of 53 genera and 36 families belonging to two different taxonomic groups i.e. angiosperms and gymnosperms were collected and preserved in the form of herbarium after drying in the folds of blotting sheets. Plants were enumerated along with their botanical name, family name, local name and Unani name. A checklist has been prepared after comparing with the existing literature of Unani System of Medicine especially used for cardiac stimulant, blood purifier, purgative and antispasmodic given in Hamdard Pharmacopoeia of Eastern Medicine.

808. **Kumar, N. 2014.** "Some plants used in Ayurvedic and Unani systems of medicine, Tehsil Joginder Nagar, district Mandi, H.P., India". *Int. J. Food, Agric. & Veterinary Sci.* 4(1): 73–80.

Abstract: Maximum rural populations of the world including India are dependent on traditional systems of medicine for their health care. India has six recognized systems of medicine (Ayurveda, Siddha, Unani, Yoga, Naturopathy and Homoeopathy). Keeping in view the importance and demand of medicinal plants, the present study has been carried out in different areas of tehsil Joginder Nagar during April 2012 to February 2014. Total 134 species belonging to 67 families and 119 genera were recorded from the study areas. All plant species are provided along with their botanical

name, family name, Unani name and Ayurvedic name. A checklist has been prepared after comparing with the existing literature of Ayurvedic and Unani System of Medicine especially with the list of medicinal plant given in Hamdard Pharmacopoeia of Eastern Medicine.

809. **Kumar, N. 2014.** "Survey on medicinal plants used in Indian System of Medicine tehsil Joginder Nagar, district Mandi, H.P., India". *Int. J. Environm. Biol.* 4(1): 82–86.

810. **Kumar, N. 2014.** "Unani medicinal plants used in gynaecological disorders from Tehsil Joginder Nagar, district Mandi, H.P., India". *Int J. Sci. & Res. Publ.* 4(4): 1–8.

Abstract: Most population of India has been using the herbal medicine since time immemorial and medicinal plants are not only the source of herbal medicines but also plays major role in pharmaceutical industry. Keeping in view the importance medicinal plants and increasing demand of herbal medicines, the present study has been carried out in different areas of tehsil Joginder Nagar during April 2012 to December 2013, because tehsil Joginder Nagar is repository of medicinal important floral diversity due to suitable environmental conditions. India has six recognized systems of medicine (Ayurveda, Siddha, Unani, Yoga, Naturopathy and Homoeopathy). Maximum rural and some urban population are dependent for their health care on Unani system of Medicine due to low cost and safe health care solution. Total 83 species belonging to 58 families and 79 genera were recorded from the study areas. All plant species are provided along with their botanical name, family name, local name, Ayurvedic name and part used. A checklist has been prepared after comparing with the existing literature of Unani System of Medicine and especially with the list of medicinal plant used in Unani System of Medicine for abortifacient, emmenagogues, stimulant and depressant action on uterine muscle given in Hamdard Pharmacopoeia of Eastern Medicine.

811. **Kumar, N. 2014.** "Seeds of some plants used in Unani system of medicine from Tehsil Joginder Nagar, district Mandi, H.P., India". *Int. J. Geology, Earth & Environm. Sci.* 4(1): 211–215.

Abstract: The medicinal plants not only having the medicinal values against various ailments but also provide food and raw materials for livelihood. India has six recognized systems of medicine (Ayurveda, Siddha, Unani, Yoga, Naturopathy and Homoeopathy). Keeping in view the importance of medicinal plants, the present study has been carried out in different areas of tehsil Joginder Nagar during January 2013 to February 2014. Total 47 species belonging to 30 families and 45 genera were recorded from the study areas. Seeds are not only the basis of agriculture but also used in Unani System of Medicine to prepare medicines. All plant species are provided along with their Botanical name, Family name, Local Name, Unani name and their month of collection. A checklist has been prepared after comparing with the existing literature

of Unani System of Medicine especially with the list of medicinal plant given in Hamdard Pharmacopoeia of Eastern Medicine.

812. **Kumar, N. 2014.** "Important medicinal plants of tehsil Joginder Nagar, district Mandi, H.P., India". *Int. J. Res. Pharmaceut. & Biosci.* 4(2): 15–21.

813. **Kumar, N. 2014.** "Studies on medicinal plants used in Ayurveda from Tehsil Joginder Nagar, district Mandi (Himachal Pradesh), India". *J. Environm. Sci., Computer Sci. Engineering & Technol.* 3(3): 1111–1121.

Abstract: Himachal Pradesh is situated in the lap of western Himalaya. It is repository of medicinal and aromatic plants due to variable geographical and environmental conditions. The present study has been conducted in different areas of tehsil Joginder Nagar, District Mandi (H.P.) during April 2012 to February 2014. During the course of study, 152 plant species of 129 genera and 70 families belonging to three different taxonomic groups i.e. angiosperms, gymnosperms and pteridophytes were collected and preserved in the form of herbarium. Plants were identified with the help of various published flora and books. All plant enumerated along with their botanical name, family name, local name and Ayurvedic name. A checklist has been prepared after comparing with the existing literature of Ayurvedic system of medicine.

814. **Kumar, N. 2014.** "Some medicinal plants of Tehsil Joginder Nagar, district Mandi, H.P., India". *Int. J. Basic & Appl. Med. Sci.* 4(1): 210–222.

Abstract: Himachal Pradesh is known to supply a very large proportion of the medicinal plant requirements of India. Tehsil Joginder Nagar is repository of medicinally important floral diversity, due to altitude variation and suitable climatic condition. The present study was carried out in different areas of Tehsil Joginder Nagar during April 2012 to December 2013. Total 35 species belonging to 27 families and 32 genera were recorded. Out of 27 families of angiosperms 23 (33 species) were Dicotyledons and 2 (2 species) were Monocotyledons. All specimens were arranged as per Bentham and Hooker (1862-1883) system of classification. Among these families the predominant families are Caesalpiniaceae represented with maximum number of species i.e. 4; followed by Combretaceae and Euphorbiaceae with 3 species each; Asteraceae with two species and remaining 23 families were with single species only. All plant species were provided with scientific name, Family name, Local name, Hindi name, Ayurveda name, Unani name, Siddha name, English name, Habit, month of collection, Part used and their uses. All collected plant species were compared with the existing literature of the medicinal plants for their medicinal value.

815. **Kumar, N. 2014.** "Medicinal plants used in Ayurveda available at Tehsil Joginder Nagar, district Mandi (H.P.), India". *Int. J. Green & Herbal Chem.* Sec. B 3(3): 1220–1231.

Abstract: The present study has been conducted in different areas of tehsil Joginder Nagar, District Mandi (H.P.) during July 2013 to May 2014. During the course of

study, 135 plant species of 116 genera and 71 families belonging to two different taxonomic groups i.e. angiosperms and gymnosperms were collected and preserved in the form of herbarium. Plants were identified with the help of various published flora and books and arranged according to Bentham and Hooker (1862-1883)1 system of classification. All plant enumerated along with their botanical, family, local, English, and Ayurvedic name. A checklist has been prepared after comparing with the existing literature of Ayurvedic system of medicine.

816. **Kumar, N. 2018.** "Ethno botanical uses of some xerophytic plants growing in dry habitat of Hamirpur district of Himachal Pradesh". *CPUH Res. J.* 3(2): 146–154.

Abstract: Xerophytes are the plants growing in relatively dry habitat. Xerophytes can withstand a prolonged period of drought uninjured and for this, they have specific adaptations such as reduced leaf surface area to check transpiration, leaves may be modified into phyllode, lamina of leaf may be very much segmented or long, narrow and needle like, stem may be modified into phylloclade or cladode, coating of hair, wax and spines on the stem and root system is extensive, penetrating very deep and root hairs and root hairs and root caps are well developed. Xerophytes growing in the dry habitat and the areas where there is less rainfall. But there are some xerophytes which are grown in the dry habitat or in dry condition of Hamirpur district of Himachal Pradesh. This district is smallest district of Himachal Pradesh which is surrounded by dense forests and which are full of medicinal plants and other plants of ethno botanical importance. Traditional knowledge about local plants was used by the local people of this region. This traditional knowledge about particular floral diversity of an area is necessary for the identification of plants and their folk uses for the purpose such as for food, shelter, cloths, fodder fuel, in case of religious ceremonies and in case of primary health care. This research paper revealed the ethnobotanical uses of some xerophytic plants which are grow in dry habitat or in dry conditions in Hamirpur district of Himachal Pradesh.

817. **Kumar, N. & Choyal, R. 2012.** "Traditional phytotherapy for snake bites by the local rural people of Hamirpur district in Himachal Pradesh (India)". *Biol. Forum- An Int. J.* 4(1): 98–106.

Abstract: Hamirpur district is the most literate and smallest district of Himachal Pradesh. Due to favourable climatic conditions and suitable environment, this region serve as a good habitat for the growth of various varieties of medicinal herbs which are used for the treatment of various diseases and ailments. Snake are poisonous animals and they are found in every parts of study area. So snake bite is the common problem of this district. This paper provides the information about the ethnobotanical and traditional uses of local people of this district for snake treatment. This work is an effort to present the traditional phytotherapeutical and ethnobotanical observations recorded with respect to snake bite.

818. **Kumar, N. & Choyal, R. 2012.** "Ethnobotanical notes on some plants of Hamirpur district of Himachal Pradesh used in the treatment of arthritis, rheumatism and other inflammatory disorder". *Indian J. Pl. Sci.* 1(2&3): 1–8.

Abstract: Arthritis, rheumatism and other inflammatory disorders are the common problems of the local people in this area. The people of this area have good deal of faith on the local plants used for the treatment of these problems. The traditional healers have a commendable knowledge of medicinal plants used for these problems. Ethnobotanical studies reveal the use of 36 plants belonging to 26 families, which are especially used to cure arthritis, rheumatism and other inflammatory disorder.

819. **Kumar, N. & Choyal, R. 2012.** "Ethnobotanical notes on some plants used for the treatment of Leucorrhoea and other gynaecological problems in Hamirpur district of Himachal Pradesh". *Int. J. Fundamental & Appl. Sci.* 2: 126–133.

Abstract: Hamirpur district is the smallest district of Himachal Pradesh which is surrounded by thick forests. This district serves as good hot spot for the growth of various types of medicinal herbs. The local use of various plants for the treatment of various diseases and ailments has been an old practice. But this practice nowadays forms the basis of new plant based medicinal therapy for the treatment of various disorders. Leucorrhoea is mostly seen gynaecological problem among the females of this region. The females of this region still have a good faith on use of local plants for the treatment of various health related problems. The present paper reveals the use of 27 local plant species especially used to cure Leucorrhoea and other gynaecological problems.

820. **Kumar, N. & Choyal, R. 2012.** "Traditional use of some plants of Hamirpur district of Himachal Pradesh for the treatment of jaundice, hepatitis and other liver disorders". *Int. J. Theoretical & Appl. Sci.* 4(2): 201–205.

Abstract: Hamirpur district is the smallest district of Himachal Pradesh due to its area. The district surrounded by thick forest area which is rich in diverse vegetation. The pattern of the use of the local medicinal herbs for the treatment of various diseases and ailments has been an old practice. But the people of the district still depends upon the uses of local plants for their primary health problems treatment. This paper provides the information about the traditional uses of 28 plants of Hamirpur district for the treatment of jaundice, hepatitis and liver disorders.

821. **Kumar, N. & Choyal, R. 2013.** "Ethnomedicinal uses of some plants of lower foot hills of Himachal Pradesh for the treatment of oral health problem and other mouth disorders". *Int. J. Appl. Res.* 1: 1–5.

Abstract: In this study, an ethnbotanical survey of the plant diversity was carried out in lower foot hills villages of six districts i.e. Kangra, Hamirpur, Mandi, Una, and Bilaspur of Himachal Pradesh. The study was mainly focused on the traditional uses of the 32

medicinal plants of lower foot hills used for the treatment of oral health problems and other mouth disorders of nearby village inhabitants. The information was carried out by the personal interviews of local old people. This study was totally focused on keeping the record of the medicinal potential possessed by the plant growing in this area and their sustainability for the welfare of human race.

822. **Kumar, N. & Choyal, R. 2013.** "Traditional health care practices used for respiratory disorders by the rural people of Hamirpur district of Himachal Pradesh". *Life Sci. Leaflets* 4: 41–50.

823. **Kumar, N., Jakhar, A.K. & Choyal, R. 2014.** "Traditional uses of some medicinal plants of Hamirpur district of Himachal Pradesh for the treatment of diabetes". *Int. J. Advanced Res.* 4(2): 131–138.

Abstract: Diabetic problem is the common problem among the people of this region. This region is well developed by all means; still the peoples of this zone have a good deal of knowledge on local plants used for many diseases such as jaundice, piles, skin diseases and diabetes etc. The traditional healers have a huge amount of knowledge of medicinal plants which are used for diabetic problems and other health problems. The present study reveals the use of 19 plants especially used to cure diabetic problem.

824. **Kumar, N., Jakhar, A.K. & Choyal, R. 2014.** "Ethnomedicinal uses of some plants of Hamirpur district of Himachal Pradesh for the treatment of piles". *Life Sci. Leafl.* 50: 1–10.

Abstract: Hamirpur district is the smallest district of Himachal Pradesh due to area wise but this district is a repository of medicinal, aromatic, religious plants and the traditional knowledge associated with them. The use of plant resources in their daily life has been an old practices of the people inhabiting in this district. The people living in remote areas of Hamirpur district (Himachal Pradesh) throws the light on the use of 21 medicinal plants of the region with their part/ parts which are used for treatment of piles.

825. **Kumar, N., Sharma, B.P. & Chandel, S. 2015.** "Study of traditional used local plants as source of dye and tannin of Hamirpur district of Himachal Pradesh". *Life Sci. Leafl.* 64: 50–57.

Abstract: Hamirpur district is the smallest district of Himachal Pradesh which falls in the Shivalik hills. This region is rich in diversity of flora and traditional knowledge associated with the use of local plants for various purposes such as food, fuel, fodder, timber, religious, medicinal, shelter, tannin and dye which forms the basis of various commercial industries. The local person of study region depends up on traditional use of local plant parts for meeting their daily requirements. This paper reveals the use of 13 plant species belonging to 12 families which yield dye and tannin.

826. **Kumar, N., Sharma, S., Sharma, K. & Sharma, S.D. 2015.** "Ethno-medicinal uses of some plant in the treatment of constipation, diarrhoea, dysentery and other stomach and digestive disorders from district Hamirpur (Himachal Pradesh), India" *Int. J. Curr. Res. Biosci. & Pl. Biol.* 2(11): 36–40.

Abstract: In this study, an ethnobotanical survey of the plant diversity was carried out in the different remote areas of Hamirpur district which fall in lower foot hills of Himachal Pradesh, India. The study was mainly emphasized on traditional uses of the herbal plants of Hamirpur district which are used for the treatment of constipation, diarrhoea, dysentery and other stomach and digestive problems. The information was carried out about the uses of herbal plants for primary health care and the treatment of various health disorders through the personal contact and personal interview of rural old people of study area. This study was mainly focused on keeping the record of the herbal potential possessed by the plant growing in this area and their sustainability for the welfare of human race.

827. **Kumar, Puneet, Manikandan, R., Panwar, G.S. & Srivastava, S.K. 2017.** "Diversity of high altitude ethno-medicinal plants in Himachal Pradesh, India". *Indian Forester* 143(2): 165–179.

Abstract: Himachal Pradesh has a great altitudinal range (300-7,000 m asl), with varied habitats, species, populations, communities and ecosystems. There are more than 3,400 different species of angiosperms are reported to be found in the state. More than 1,000 species have been documented as medicinal and aromatic for the states occurring in Shiwalik ranges, temperate forests, sub-alpine and alpine pastures. Majority of the population in the state lives in the villages and belong to diverse cultures and communities, with specific traditional knowledge. In the remote areas, especially high altitude area of the state is devoid of modern medical facilities and therefore rural and tribal people mainly depend on local medicinal plants. Herein we compiled 230 species belonging to 66 families of wild plants (186 herbs, 25 shrubs, 11 trees and 8 climbers) used by the tribal/rural people dwelling in the high altitude areas of Himachal Pradesh. Out of these, 45 species falls under critically vulnerable and endemic categories.

828. **Kumar, P. & Singhal, V.K. 2013.** "Ethnobotany and ethnomedicinal uses, chromosomal status and natural propagation of some plants of Lahaul-Spiti and adjoining hills". *J. Bot.* 2013: 1–14.

Abstract: The present study documented the ethnobotanical and medicinal uses of plants from an ecologically fragile cold desert area of Lahaul-Spiti (Himachal Pradesh, India). Local people use plants for curing the stomach troubles, pain reliever, cough, gastric disorders, and aphrodisiac and other household purposes. In addition, chromosome numbers, male meiosis, and natural propagation were also investigated

in these ethnobotanically used plants. Present investigations also form the basis for exploitation of intraspecific chromosomal variation/new cytotypes recorded in some of the presently studied species to detect biochemical diversity in the medicinally important plants. For documentation of ethnobotanical information, personal observations and interviews were conducted with medicine men, hakims, farmers, shepherds, local healers, and old aged people. This study identified 40 plant species under 33 genera belonging to 17 families which have been used locally for curing various diseases and other purposes. All the chromosome counts are new to the study area. On worldwide basis, meiotic chromosome counts of and in *Rosularia alpestris* and *Corydalis govaniana*, respectively, are the first ever reports. The present study indicates that the people of the area possess good knowledge about the different uses of plants in the area. It has been noticed that due to the lack of interest among younger generations in the preservation of invaluable ethnic knowledge, there is every possible chance of losing such a rich heritage of knowledge. It is very urgent to conserve such invaluable ethnic knowledge before it gets lost.

829. **Kumar, P., Singh, V., Singh, A. & Kumar, S. 2014.** "Ethnobotanical studies of plant species associated with *Hippophae* sp. in Chandra Valley a part of Cold Desert Biosphere Reserve Himachal Pradesh, India". *Ann. Pl. Sci.* 3(7): *754–757*.

Abstract: Himalayan ecosystem is known for its unique climate and plants wealth but the indiscriminate use of plant resources and increasing human interventions increases serious threat to their survival. The present study provides the information on the distribution patterns and traditional uses of medicinal plant species in the high-altitude (3298 m asl) cold desert of India in Himachal Himalayas. The people still depend upon household and traditional uses for remedies and health care. In this survey a total of 27 important medicinal plant species belonging to 15 families were recorded in grassland under Seabuckthorn community. Based upon importance value index, *Eragrostis minor* (44.30), *Equisetum arvense* (15.28) and *Chaerophyllum villosum* (8.41) showed its dominance in the grassland habitat. The Diversity Index (H') was highest in case of *Eragrostis minor* (0.37), *Carex setosa* (0.29) and *Astragalus grahamianus* (0.12). The value of Concentration dominance (Cd) was found to be highest in *Eragrostis minor, Equisetum arvense* and *Carex setosa*. This study provides a framework for making the effective implementation of conservation strategies in the Himalayan region.

830. **Kumar, Sudhir & Paul, R. 2010.** "Ethno-medicinal plants used for oral diseases in Kangra district (Himachal Pradesh)". *Ann. Forest.* 18(1): 123–128.

Abstract: The present paper highlights 22 medicinal plants used to cure mouth problems such as mouth ulcers, bleeding gums, toothache, pyorrhoea, etc. among tribal people of Kangra valley, Himachal Pradesh. During ethno-botanical survey, authors collected

22 medicinal plants belonging to 20 angiospermic families. Important ethnomedicinal uses of medicinal herbs, local name, parts utilized and mode of treatment have been recorded.

831. **Kumar, Sudhir & Paul, R. 2010.** "Ethnomedicinal plants used to cure spermatorrea in Kangra district (Himachal Pradesh)". *Advances Pl. Sci.* 24(2): 691–693.

Abstract: The present paper highlights 17 medicinal plants used to cure spermatorrea (locally called Dhat) among tribal people of Kangra valley. In ethnobotanical survey, we collected 17 medicinal plants belonging to 12 angiospermic families. A brief important ethnomedicinal uses of medicinal herbs, local name and mode of treatment have been reported.

832. **Kumar, Sudhir & Paul, R. 2011.** "Traditional use of medicinal plants to cure arthritis among the tribal communities of Kangra district, Western Himalaya". *J. Econ. Taxon. Bot.* 35(1): 90–94.

Abstract: This paper provides brief ethnomedicinal uses of 20 plant species belonging to 20 genera and 18 families used by the Gaddi, Gujjar and Dhogri tribes of Shivalik and Dhauladhar range of Kangra district, Himachal Pradesh. These plant species have been arranged alphabetically with their family, local name and ethnomedicinal uses.

833. **Kumar, Suresh.** 2015. "Ethnobotanical uses of some medicinal plants of district Mandi, Himachal Pradesh". *J. Biol. Chem. Chron.* 2(1): 34–37.

Abstract: Himachal Pradesh, one of the pioneer Himalayan States is a rich repository of medicinal flora. The paper documents the traditional knowledge of some medicinal plants that are used by the inhabitants of Mandi district of Himachal Pradesh to cure various diseases. The present study was conducted to assess and document the knowledge and use of medicinal plant species used by the traditional healers to treat different ailments.

834. **Kumar, Suresh. 2012.** "Unexplored ethnobotanical uses of some plants of family Euphorbiaceae". *J. New Biol. Rep.* 1(2): 67–69.

Abstract: The present study is based on the ethnobotanical explorations of three species of family Euphorbiaceae, carried out during 2011-2012 in various villages of Himachal Pradesh. For a better understanding of local beliefs and traditional uses of the plants belonging to family Euphorbiaceae, field tours had been organized in different villages of Himachal Pradesh and different categories of people like village heads, medicinemen, old experienced and knowledgeable informants were repeatedly interviewed. The information collated has been presented along with local name of the plant, distribution, reproductive cycle, botanical description, parts used, ethnobotanical uses and use/s in literature.

835. **Kumar, Suresh, Priya, Bhanu & Thakur, Kalpana. 2018.** "Some traditional herbal remedies in Sunder Nagar tehsil of district Mandi (H.P.)'. *CPUH Res. J.* 3(2): 155–159.

Abstract: Plants have been used for medicinal purposes since prehistoric period. The healing properties of herbal medicines have been recognized in many ancient cultures. The traditional medical systems such as Ayurveda, Siddha and Unani are practiced since time immemorial and honoured by people still today. Himachal Pradesh, one of the pioneer Himalayan States is a rich repository of medicinal flora. People of the state having traditional lifestyle, rely to a large extent on native plant species for their healthcare management. Sunder Nagar Tehsil in Mandi district of Himachal Pradesh is the home of several traditional practices and harbours a great diversity of plants species which have been used for curing various ailments. The present investigation has been carried out for documenting the valuable information regarding medicinal plant diversity and traditional herbal practices in various villages of the Sunder Nagar Tehsil of district Mandi (H.P.).

836. **Kumar, S. & Sharma, S. 2013.** "Species diversity, uses and distribution of medicinal plants along with an altitudinal gradient in Paddar valley, north Western Himalaya". *Int. J. Med. Aromat. Pl.* 3(3): 343–351.

Abstract: The present study reveals the species diversity, uses in different medicine systems and distribution of medicinal plants along an altitudinal gradient ranging from 1800 to 5500 m asl in Paddar valley in northwestern Himalaya. The temperature and sub-alpine elements of vegetation from 1800 to 3400 m reveal the predominance of closed canopy forest mostly the conifers, whereas the herbaceous flora above tree line i.e. above 3400 m exhibit maximum species diversity, which further decline with increasing elevation. A total of 295 species belonging to 222 genera distributed in 78 families were recorded for their medicinal properties with 284 species being used in folk medicine, 90 species in Ayurveda, 58 species in Unani, 50 species in Siddha, 37 species in Homeopathy, 23 species in Tibetan and 22 species in modern medicine.

837. **Kumar, S., Sharma, S.D. & Kumar, N. 2015.** "Ethnobotanical study of some common plants from district Hamirpur of Himachal Pradesh (India)". *Int. J. Advanced Res.* 3(2): 492–496.

Abstract: The paper documents the ethonobotanical uses of 25 wild medicinal plant species that are used by local peoples residing in remote areas of Shiwalik hills of district Sirmaur (H.P.) in household remedies. The plant parts most commonly used in the treatment of various diseases are root, leaves, seeds and whole plant. The people of the district still depend upon the uses of local plants for their prime health problems handling. The reliance on folk medicine for healthcare is associated with the traditional belief of effectiveness.

838. **Kumari, Anita, Samant, S.S. & Sharma, Shashi. 2016.** "A study on traditionally used medicinal plants and associated practices in Anni Khad Watershed of district Kullu, Himachal Pradesh, Western Himalaya". *J. Non-Timber Forest Prod.* 23(4): 199–219.

Abstract: Traditional systems of health care by using medicinal plants have been in use since times immemorial and are becoming widely accepted globally even today. The Himalayan Mountains are known to be the store houses of biological and cultural diversity. Himachal Pradesh, a region of IHR, is a well known medicinal plant hotspot that is a rich repository of diverse flora. The local inhabitants use this diverse plant diversity for treating diverse ailments and also as a source of income generation. However, this traditional knowledge runs the risk of vanishing as it is not present in proper documented form. The present study, therefore, aimed to exlore and documents the commonly used medicinal plants of Anni Khad Watershed of district Kullu, Himachal Pradesh. The information was collected by personal interviews with local healers nd other knowledgeable persons. A total 353 medicinal plants species belonging to 106 families are recorded. Also, the information regarding part used, indigenous uses, nativity and endemism and altitudinal distribution of these medicinal plants is also documented. Appropriate management options have been suggested for conservation.

839. **Kumari, A., Sehgal, R.N. & Kumar, S. 2008.** "Traditional agroforestry systems practiced in Lahaul (Lahaul & Spiti) and Kinnaur districts of Himachal Pradesh". *Indian Forester* 134(8): 1003–1010.

Abstract: Traditional agroforestry systems prevalent in Lahaul area were agri-silvicultural system. Generally five agroforestry systems were identified i.e. agri-horticultural, agri-silvicultural, agrisilvi- pastoral, pastoral-silviculture and pastoral-horticultural. Whereas, in District Kinnaur most prevalent agro-forestry system was agri-horticultural. Four agroforestry models were identified i.e. agri-horticultural, agri-silvicultural, pastoral-silvicultural and pastoral-horticultural. Major tree species of the area were *Salix*, Poplar and Apple.

840. **Kumari, A., Sharma, D., Bawa, R. & Kaushal, P. 2012.** "Non Timber Forest Products used for mother and child health care in tribal and remote areas of Himachal Pradesh". *Indian Forester* 138(12):1151–1159.

Abstract: Modern healthcare system has negligible accessibility in the interior, remote and harsh areas of the northwestern Himalayas. People residing in these areas still depend upon traditional healthcare system. The study carried out in tribal and non tribal communities located in Kinnaur, Lahul, Bharmour and Pangi (tribal areas) Shilai, Churah, Parvati valley and Chhauhara (non tribal but remote areas) in Himachal Pradesh revealed that 9 species are used as tonic and as nutritional supplements by

the expecting mothers. Species like *Betula utilis* and *Dioscorea deltiodea* for birth control *Bunium persicum* and *Thymus serphyllum* for relief from post delivery pain, similarly *Cannabis sativa*, *Papaver somniferum* and *Selinum vaginatum* are utilized as pain killers. *Chenopondium album* is used for the cure of chicken pox, *Bombax ceiba* during small pox and for urine problems, *Arctium lapa* and *Capsella bursa-pastoris* are used specially in case of infants. It was also observed that due to illicit trade of the much demanded medicinal and aromatic species, many species namely *Aconitum hetrophyllum*, *Podophyllum hexandrum*, *Rheum australe*, etc. are on the verge of extinction. Thus there is dire need to educate the rural people to conserve their rich wealth for their own utilization.

841. **Kumari, K. & Saggoo, M.I.S. 2015.** "Traditional and ethnomedicinal uses of some grasses (Poaceae) of Kinnaur, Himachal Pradesh, India". *Ann. Pl. Sci.* 4(10): 1195–1198.

Abstract: Himachal Pradesh, a part of Western Himalaya, is a repository of medicinal and aromatic plants and the traditional knowledge associated with these plants. The people living in remote and tribal areas still depend on household remedies for healthcare. The Kinnaur district inhabited by tribal community known as Kannaura, have a great respect for and faith in Amchi system of medicine. Various localities were visited during May 2011 to September 2014 and ethnobotanical information was collected through interviews with elderly people, women, shepherds and local amchi, to highlight the traditional use of medicinal grasses by the native people. The present paper provides information on the medicinal uses and other traditional uses of 20 wild species of grasses belonging to family Poaceae. The present study contributes significant ethnobotanical information about grasses from this remote high altitude and difficult region of the World, which remains snowbound and cut off from the rest of the World for 5-6 months due to heavy snow fall.

842. **Kumari, P., Samant, S.S., Kumar, Deepak, Puri, S. & Singh, A. 2019.** "Assessment of economically important floristic diversity of Kamrunag sacred grove and surroundings in Himachal Pradesh, North western Himalaya, India". *J. Non-Timber Forest Prod.* 25(3): 145–160.

Abstract: The sacred groves of the Indian Himalayan region have not been explored for the ecosystem services provided by them. Therefore, present attempt has been made to assess the economically important floristic diversity of Kamrunag sacred grove. A total of 249 species of economical importance belonging to 74 families and 168 genera were recorded. Of these 165 species were used as medicine and 37 species used as edible; fodder (23 spp.); fuel (11 spp.); timber (6 spp.); religious (3 spp.); dye and miscellaneous (4 spp.). Different parts of the plants were utilised, of which whole plant was used in majority of cases. Maximum number of native (134),

non-native (115) and near endemic (68) species were found at an altitudinal range of 1800-2800 m. Four species, viz., *Pimpinella acuminata, Goldfussia dalhousiana, Angelica glauca* and *Wikstroemia canescens*) were found endemic to the Indian Himalayan region. Management options for the conservation and sustainable utilization of the species have been suggested.

843. **Kumari, P., Samant, S.S., Puri, S., Singh, A. & Rathore, S. 2019.** "Diversity, indigenous uses and traditional practices of dye yielding plants in Central Himachal Pradesh, North western Himalaya". *Indian J. Tradit. Knowl.* 18(3): 560–564.

Abstract: The present paper is an attempt to assess the diversity and document the indigenous uses and traditional practices of dye yielding plants in Central Himachal Pradesh North Western Himalaya. A total of 17 species of dye yielding plants belonging to 13 families and 17 genera were recorded. These species are used to dyeing clothes and other items. Different plant parts were utilized, of which fruit (7 spp.) was used in the majority, followed by flowers (5 spp.); bark (4 spp.) and leaves (3 spp.) Information on indigenous uses and traditional practices was documented with the help of local inhabitants. Natural dye yielding plants have immense significance in the socio-economic and socio-cultural aspects of the inhabitants. The indigenous knowledge of extractions, processing and practices of *in-situ* and *ex-situ* conservation of the species; natural dyes has declined to a great extent. Therefore, to maintain dye yielding plant wealth, awareness among the inhabitants; involvement of local inhabitants and Forest Department about the indigenous uses and traditional practices have been suggested.

844. **Kumari, S. & Sharma, Sandeep. 2017.** "Ethnobotanical survey of wild edible plants of common herbs of Baijnath region Himachal Pradesh". *Indian J. Trop. Biodiv.* 25(2): 210–213.

Abstract: The present study is concerned with the ethnobotanical evaluation of wild edible plants of Baijnath region of district Kangra, Himachal Pradesh. The survey was carried out in 2014 and about 32 wild edible plants were identified and documented with their scientific names, common names, family and edible parts. Wld edible plants are rich source of protein, vitamins and minerals. Native of Baijnath region frequently use wild edible plants, however their popularity has decreased now a days.

845. **Kumari, S., Sharma, Sandeep & Dutt, B. 2015.** "Traditional uses of common herbs of Baijnath region of Himachal Pradesh, India". *World J. Pharm. & Pharmaceut. Sci.* 4(10): 916–922.

Abstract: An ethnobotanical survey was carried out during 2014 in Baijnath region of district Kangra, Himachal Pradesh for the documentation of common herbs used by local community. About 23 herbs were recorded & identified with scientific name, family name, vernacular name, part used and folk uses. Information pertaining to

traditional uses of those herbaceous plants was obtained through personal interview in semi structured questionnaire and compiled on the basis of plants part used for curing various ailments and documented for further studies future reference.

846. **Lal, B. & Singh, K.N. 2008.** "Indigenous herbal remedies used to cure skin disorders by the natives of Lahul-Spiti in Himachal Pradesh". *Indian J. Tradit. Knowl.* 7(2): 237–241.

Abstract: The communication highlights the medicinal importance of some plants used to cure different skin disorders by the native people inhabiting Lahaul-Spiti district of Himachal Pradesh. Ethnomedicinal information on 18 plant species belonging to 14 families, used by the inhabitants for curing different skin disorders including boils and blisters, itching (allergy), skin infection, leprosy, skin eruptions, cuts and wounds, were recorded. Details regarding plant names, local names, family, mode of administration and ailments treated, for each species are reported.

847. **Lal, B., Chawla, Amit, Singh, K.N. & Rajkumar, S. 2006.** "Ecology and ethnobotany of *Herniaria incana* Lam.-– A lesser known taxon from Himachal Pradesh". *Indian J. Forest.* 29(2): 187–189.

Abstract: The ecological and ethnobotanical surveys in different localities of Himachal Pradesh revealed that *Harniaria incana* Lam., is a good soil binder, and confined to the Pangi subdivision of Chamba district in Himachal Pradesh. Phyto-sociological analysis of this herb in the natural habitat suggest that it forms a single strand rather than associated with other herbs. It has also been observed that the plant is not a palatable herb to livestock as it is found intact in grazed area. The ethnic knowledge reported here on *H. incana* Lam. is hitherto unknown.

848. **Lal, B., Negi, H.R., Singh, R.D. & Ahuja, P.S. 2004.** "Medicinal uses of *Dactylorhiza hatagirea* among the natives of higher altitudes in western Himalaya". *J. Orchid Soc. India* 18: 97–100.

Abstract: The present communication deals with the studies pertaining to field observations recorded on indigenous therapeutic applications of *Dactylorhiza hatagirea* (D. Don) Soo among the native people inhabiting high mountain areas of Himachal Pradesh, in western Himalaya. Information regarding areas surveyed, ethnic groups studied, medicinal properties and mode of usage of Salam-panja as recorded during field studies are given. Besides discussing its traditional therapeutic utility in detail, the paper also deals with the conservation strategies for long-term sustenance of this orchid species in the Himalaya.

849. **Lal, B., Vats, S.K., Singh, R.D & Gupta, A.K. 1996.** Plants used as ethnomedicine and supplement food by the Gaddis of Himachal Pradesh, India. In: Jain, S.K. (Ed.), *Ethnobiology in Human Welfare*. Deep Publishers, New Delhi. Pp. 384–387.

850. **Lal, C. & Verma, L.R. 2008.** "Indigenous Technological Knowledge on soil and water management from Himachal Himalaya". *Indian J. Tradit. Knowl.* 7(3): 485–493.

Abstract: Over a millennium indigenous people of Himachal Pradesh have evolved a large number of practices locally called Indigenous Technical Knowledge (ITK) relating to soil and water management systems suitable for different agroclimatic conditions of the state. The ITK regarding soil and water management systems were collected and compiled through PRA and household interviews in the remote and rural area of Himachal Pradesh. In several parts of the Himachal Himalaya, villages are located at the foothills or in the valleys. Villagers often harvest rainwater by building small water storage ponds commonly called chal. In hills, there is traditional practice to plough the fields early in the morning before dew or fog is evaporated for the conservation of water. Spring water is collected in small reservoirs scattered at intervals on the high uplands and then drawing water from these ponds when required. Heavy snow is melted with the help of ash. Ash is spread / broadcasted over field for weed control, surface soil crust breaking, and making soil more porous by conserving the rainwater. In Kinnaur district, soil mulching is done with *Pinus*, Chilgoza needles and grasses from the kandas/hill top. Mulching conserves soil moisture in the field and also helps in maintaining the soil temperature. In the lower areas of Himachal Pradesh during the rainy season, roof water is collected in dugout structures known as diggi in Kangra and khatis in Hamirpur and Bilaspur district. Khatis provides stored water, which is the main source of water. Farmers have been managing soil and water by making arrangements for the safe disposal of excess water.

851. **Lal, M. & Samant, S.S. 2015.** Diversity, uses and prioritization of medicinal plants in Kais Wildlife Sanctuary, North Western Himalaya, India. In: Sharma, P., Bharti, P.K. & Singh, N. (Eds.), *Medicinal Plants: Distribution, utilization and Significance*. Discovery Publishing House Pvt. Ltd., New Delhi, Pp. 98–112.

852. **Lata, S., Seth, M.K. & Kaushal, P. 2016.** "Ethnobotanical studies on wild edible plants of Tidong valley of district Kinnaur (H.P.)". *Int. J. Sci. & Res.* 5(8): 1790–1792.

Abstract: The wild edibles served as a dietary supplement and medicine for thousands of years, particularly in the tribal and rural areas of the Himalayas. India is home of large number of indigeneous tribes who are still untouched by the lifestyle of this modern world. These tribal people have their own culture, tradition, language and lifestyle. The state of Himachal Pradesh is inhabitated by different tribal communities of which Kinnaura is one of them. Native people of Tidong valley in district Kinnaur are still dependent on natural plant resources and still collect root, shoot, fruits, flowers and other forest produce to supplement their main diet. A total of 44 wild food plants, belonging 38 genera and 28 families were reported from Tidong valley of which herbs, shrubs, trees and climbers are 25, 14, 4 and 1 respectively. As cultural

and biological diversity are closely interlinked, the traditional knowledge of particular region has great potential to contribute to environmental conservation and management.

853. **Man, V. & Dutt, B. 2008.** "Ethnobotanical studies in Sangla valley, district Kinnaur in Himachal Himalayas". *J. Econ. Taxon. Bot.* 32(Suppl.): 58–64.

Abstract: An ethnobotanical study has been carried out in the Sangla valley of tribal district of Kinnaur in Himachal Pradesh. The information on traditional practices of 64 species of medicinal and aromatic plants belonging to 40 genera from 28 families were collected. The plants of ethnobotanical importance are arranged alphabetically with their botanical name, family, Hindi name, local names, parts used and their ethnobotanical uses.

854. **Meenakshi. 2006.** *Documentation of Medicinal and Aromatic Plants of Kinnaur Forest Division, Himachal Pradesh*. Ph. D. Thesis. Dr Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan (Unpublished).

Abstract: 376 plant species belonging to 228 genera and 87 families have been documented. Out of these 376 plants, 350 belong to dicots, 17 to monocot and 9 species belonging to gymnosperms. The medicinal and aromatic importance of 187 plant species have been documented based on the available literature and ethnobotanical knowledge (43 species) collected from the area based on the interactions with local elderly people, village pradhans, women folks, vaids, amchies and graziers, etc.

855. **Monika, Savitri, Kumari, A., Angmo, K. & Bhalla, T.C. 2016.** "Traditional pickles of Himachal Pradesh". *Indian J. Tradit. Knowl.* 15(2): 330–336.

Abstract: The traditional pickles of indigenous fruits and vegetables, *viz*., *galgal*, *lingri*, *aaroo, plum*, *lasura*, *dehu*, *kachnar* and *beedana* are popular in rural and urban areas of Himachal Pradesh since the very early times. These are used as appetizers and served practically with every meal. The traditional pickles of Himachal Pradesh are unique in the raw material, method of preparation and taste from the pickles in other parts of country. In the present study, the methods of preparation of traditional pickles as practiced by the rural folk have been documented.

856. **Natarajan, B., Paulsen, B.S. & Korneliussen, V. 2000.** "An ethno-pharmacological study from Kulu district, Himachal Pradesh, India: Traditional knowledge compared with modern Biological Science". *Pharmaceut. Biol.* 38(2): 129–138.

Abstract: A synthesis of ethno-pharmacological knowledge and western biological science has been attempted in this paper. Thirty-four species of plants used by local women in hamlets of Banjar taluka, Kulu district, Himachal Pradesh have been recorded.

The knowledge of medicinal plants that local women have is important as they have a lifetime experience in using them through caring for themselves, their families and others around them. For the plants recorded, information from scientific literature has been included in order to explain or justify the traditional medical use.

857. **Negi, K., Singh, H.P. & Batish, D.R.** "Most prominent ethno-medicinal plants used by the tribals of Chhitkul, Sangla valley". *Ann. Pl. Sci.* 4(1): 943–946.

Abstract: Chhitkul (Latitude 31°18'50.4" to Longitude 31°18'58.9" N) in district Kinnaur, Himachal Pradesh, is the last inhabited village by the (*kannaura*) tribal population. It is known for rich diversity of plants due to unique geographical position and edapho-climatic factors. However, winters are very severe and due to heavy snowfall, the area remains cut off from the surroundings due to which movement from one place to the other is difficult. Therefore, the inhabitants were forced to develop indigenous system of medicine using native medicinal and aromatic plants. The traditional healers (*amchi*) have an in-depth knowledge about the medicinal plants required for the treatment of various ailments. Unfortunately, this knowledge of the locals is fast vanishing due to the lack of some consolidated written document associated with medicinal plants coupled with lesser revenue to the healers/ practitioners. In order to preserve this vast treasure of traditional knowledge, a study was undertaken wherein various medicinal and aromatic plants of the Chhitkul area were inventoried and ethno-medicinal knowledge regarding their uses was gathered from local folks. The present paper attempts to discuss the information related to ethnobotanical aspects of the most prominent medicinal and aromatic plants used by the natives for daily healthcare purposes.

858. **Negi, K., Singh, H.P., Batish, D.R., Sharma, A. & Kumari, Savita.** "Ethnobotanical survey of medicinal and aromatic plants of Sangla valley, district Kinnaur, Himachal Pradesh". *Int. J. Advanced Res.* 5(7): 743–750.

Abstract: Sangla Valley in district Kinnaur of Himachal Pradesh is known for its rich diversity of plants owing to its unique geographical position and edapho-climatic factors. However, due to heavy snowfall, the area remains cut off from the surroundings making movement of the people from one place to other difficult. People of the area especially the tribal have to rely on the traditional health care system involving use of medicinal and aromatic plants. Thus, the traditional healers (Amchi) have in-depth knowledge about the medicinal plants required for the treatment of various ailments. Unfortunately, this knowledge of the people is vanishing fast and also there is a lack of proper documentation of medicinal and aromatic plants of the area. In order to preserve their vast treasure of traditional knowledge, a study was undertaken where in various medicinal and aromatic plants of the Sangla Valley were inventoried and the ethno-botanical knowledge with respect to their use was collected.

859. **Negi, P.S. & Subramani, S.P. 2002.** "Ethnobotanical study in village Chhitkul of Sangla Valley, district Kinnaur, Himachal Pradesh". *J. Non-Timber Forest Prod.* 9(3/4): 113–120.

Abstract: An ethnobotanical survey has been carried out in the tribal village Chhitkul, Sangla valley of district Kinnaur, Himachal Pradesh, which resulted in the recording of 17 plant species of medicinal importance, 25 of edible and agricultural value, 14 of cultural and religious importance, and 22 species of fuel, fodder and timber values. The role of ethnic tribals in the conservation, optimum utilization of natural resources has also been discussed. The details of ethnomedicinal plants are highlighted with their botanical and vernacular names, brief description and uses. The plants of other importance are also tabulated along with vernacular names and parts used.

860. **Negi, P.S. & Subramani, S.P. 2006.** "Ethnobotanical study in the Naggar area of Kullu Valley, Himachal Pradesh". *J. Econ. Taxon. Bot.* 30(2): 349–358.

Abstract: An ethnobotanical investigation has been carried out in the Naggar area of Kullu valley, Himachal Pradesh that resulted in the documentation of valuable information on 38 plant species belonging to 23 families and 17 red listed species. The details of ethnomedicinal plants are highlighted with their botanical names, vernacular name, brief description and disease cured.

861. **Negi, V.M. & Chauhan, N.S. 2009.** "Medicinal & aromatic plant wealth of a tribal district Kinnaur in Himachal Himalayas". *Indian Forester* 135(6): 838–852.

Abstract: Himachal Pradesh, situated in the centre of the Western Himalayas, having diverse agroclimatic conditions ranging from semi-tropical to temperate, alpine and culminating to the cold desert region, is bestowed with a veritable emporium of medicinal and aromatic plants. Out of around 3,500 species, more than 1,000 species have been documented as medicinal and aromatic for the state occurring in Shivalik ranges, temperate forests, valley areas, sub-alpine and alpine pastures. A tribal district, Kinnaur of Himachal Pradesh, due to its unique geographical position and edapho-climatic conditions, has the distinction of being pioneer district in the state having rich natural resources of medicinal and aromatic plants. Kinnaur District is the largest supplier of Atish, Salampanja, Dhoop, Kutki, Bankakari, Chora, Talispatara, Revandchini, and Somlata in the country, whereas a few crops like Kuth, Kaser and Kalazeera are cultivated in Kinnaur. An exploration was undertaken for collection and identification of important medicinal and aromatic plants of the study area. The present paper highlights a total of 103 species from 79 genera belonging to 39 families, having medicinal and aromatic values, which are enlisted along with their botanical name, family, local/common name(s), part(s) used and their uses for different purposes. Out of total species, 26 species fall under different categories of threatened *viz., Aconitum heterophyllum, Arnebia benthamii, Dactylorhiza hatagirea, Podophyllum hexandrum, Taxus wallichiana, Aconitum violaceum, Angelica glauca, Corydalis govaniana,*

Dioscorea deltoidea, Picrorhiza kurrooa, Saussurea costus, Saussurea obvallata, Artemisia brevifolia, Artemisia dracunculus, Bergenia stracheyi, Delphinium brunonianum, Delphinium denudatum, Ferula jaeschkeana, Heracleum lanatum, Jurinea dolomiaea, Meconopsis aculeate, Polygonatum verticillatum, Rheum australe, Rhododendron anthopogon, Rhododendron campanulatum and Skimmia laureola. It is suggested that conservation of these endemic diversity of medicinal and aromatic plants from the study area is essential by means of different measures as early as possible, before these are wiped out from nature.

862. **Negi, V.M. & Dutt, B. 2007.** "Plants of religious beliefs among tribals of Sangla valley, district Kinnaur, Himachal Pradesh". *J. Non-Timber Forest Prod.* 14(3): 245–248.

Abstract: A survey was carried out in the Sangla valley of tribal district of Kinnaur in Himachal Pradesh to collect information on plants or religious beliefs. As a result of interaction with the local people the information on 8 plant species belonging to 7 genera from 7 families was collected. The present paper highlights the information on sacred plants.

863. **Negi, V.M., Dutt, B., Chauhan, N.S. & Thakur, Shalu Devi. 2010.** "Lesser known aromatic plants of Western Himalaya: A case study of Sangla valley, Himachal Pradesh". *J. Non-Timber Forest Prod.* 17(2): 201–207.

Abstract: The present paper attempts to enlist the lesser known aromatic plant species of the tribal district Kinnaur of Western Himalayas in India. A total of 30 aromatic plant species belonging to 29 genera under 13 families were collected and identified from the study area. These plant species are highlighted along with their botanical name, family, local/common name(s), parts used and their uses.

864. **Negi, Y.S. & Bhalla, P. 2002.** "Collection and marketing of important medicinal and aromatic plants in tribal areas of Himachal Pradesh". *Indian Forester* 128(6): 641–649.

Abstract: Collection and marketing of medicinal and aromatic plants is a highly labour oriented activity. Only right holders are allowed to collect these products. Illegal collection and marketing of the produce, however, also takes place; and the State Forest Department has taken some steps to check this practice. 'Dhoop' (*Jurinea macrocephala*) and 'Karu' (*Picororrhiza kurrooa*) are the two important items collected in the area. These are followed by 'Thuth' (*Salvia moorcroftiana*), 'Banafsha' (*Viola serpens*) and 'Patish' (*Aconitum* sps.) respectively. Collectors' net share in consumer's rupee for different products is low and ranges from about 14 to 23 per cent for 'dhoop' and 22 to 28 per cent for 'karu'. Marketing channel, Collectors. Contractor – Broker – Wholesaler – Consumers was noted to be widely in use. Contractor's margins were also noted to be high. Labour charges are the major component of collectors' cost and account for about 17 and 10 per cent of the consumer's price for 'dhoop'

and 'karu' respectively. The study points out the need to curb the practice of unscientific extraction of this forest wealth. In order that the collectors get remunerative prices, marketing of M&APs need to be streamlined and cooperative efforts may be promoted. This will help in creating a say in the market for collectors of different M&APs from the State; who individually are only small-lot sellers.

865. **Pal, D.K., Kumar, Amit, Dutt, B. & Sharma, Sachin. 2015.** "Ethnobotanical knowledge and usage of wild plants in Theog Forest Division, Himachal Pradesh, North Western Himalaya". *J. Ethnobiol. & Tradit. Med.* 124: 922–935.

Abstract: Himalayan forests are the repository of large number of medicinal plants valuable for the local people. These plants hold a great importance in traditional health care systems thereby providing clues to new areas of research in human well being and biodiversity conservation. The present study documented the indigenous knowledge and usage of 98 plants belonging to 61 families and 95 genera in Theog Forest Division of Himachal Pradesh, North Western Himalaya. The information on traditional use was collected through semi-structured questionnaires and personal interviews. The highest number of species (38) were reported to be utilized as edibles followed by medicinal and aromatic (30), fodder (23), fuelwood (16), veterinary medicine (12) and agricultural implements (8). The leaves (43 species) were most commonly used plant part followed by wood (30), fruits (21) and whole plant (10). The family Fabaceae (7 species) followed by Lamiaceae (5), Rosaceae (5) and Asteraceae (4) were the dominant families of plants utilized by the locals. Plants studied were used as medicine, food, fuelwood, fodder and in socio-religious ceremonies. The study aimed at gathering knowledge pertaining to ethnic uses of plants in order to conserve the ethnobotanical wisdom of people in the study area.

866. **Pandey, A. & Singh, S. 2016.** "Traditional phytotherapy for various diseases by the local rural people of Bharai village in the Kullu district of Himachal Pradesh (India)". *Int. J. Pharmaceut. Sci. Res.* 7(3): 1263–1270.

Abstract: An ethno-medicinal survey was undertaken in Bharai village of Kullu district in Himachal Pradesh to collect the information on the use of medicinal plants for the various diseases rampant in the area through questionnaire and personal interviews of the traditional health healers/rural people The investigation reveals that 20 plants belonging to the 16 different families are utilized by local health healers/rural people in traditional phytotherapy. This study also reveals that many people of this region still continue to rely on traditional medicine for their primary health care. There is a little documentation of ethno-medicinal knowledge was carried out in this region. In addition, several wild medicinal plants are declining in number due to destruction and unscientific collection of plants from forests. Hence there is an urgent need for

exploration and documentation of the traditional knowledge in order to conserve the local ethno-medicinal plants. Details of medicinal plants are described alphabetically with their botanical name, family, local name, parts used, disease/ailment and ethno medicinal uses.

867. **Pandey, M.M., Rawat, A.K.S. & Mehrotra, S. 2004.** "Enumeration of some potential economic plants of Mandi district in Himachal Pradesh". *J. Econ. Taxon. Bot.* 28(3): 552–555.

Abstract: Mandi district, an area of 3108 sq. km. lies in Himachal Pradesh, which is a rich source of potential aromatic plants. The present study reveals that this area still harbours considerable plants of various socio-economic importance. In the enumeration some common medicinal plants has been discussed.

868. **Parkash, Vipin & Aggarwal, Ashok. 2010.** "Traditional uses of ethnomedicinal plants of lower foot-hills of Himachal Pradesh-I". *Indian J. Tradit. Knowl.* 9(3): 519–521.

Abstract: The paper documents the traditional knowledge of medicinal plants that are used by the indigenous villagers residing in remote foot-hill areas of Himachal Pradesh in household remedies. An ethnobotanical survey was conducted on lower foot-hills of Himachal Pradesh during 2007-08. About ten different ethnobotanical plant species were recorded for their medicinal uses and for other remedial purposes by the local inhabitants. There were seven families of which Asteraceae and Amaranthaceae families were mostly exploited by the people. *Abrus precatorius* is found vulnerable in Hamirpur district due to its excessive exploitation for various purposes by the local contractors. *Crotolaria juncea* is not only used as medicinal plant but it is also used as green manure in the fields. During survey, it is also found that some plant species such as *Abrus precatorius, Eclipta alba, Deeringia amaranthoides* and *Physalis minima* require *in situ* as well as *ex situ* conservation in the area for maintaining future germplasm source.

869. **Pathak, Promila, Bhattacharya, A., Vij, S.P., Mahant, K.C., Dhillon, M.K. & Piri, H. 2010.** "An update on the medicinal orchids of Himachal Pradesh with brief notes on their habitat, distribution and flowering period". *J. Non-Timber Forest Prod.* 17(3): 365–372.

Abstract: Orchids have been used in the local system of medicine, in different parts of the world since time immemorial. Presently, extensive field surveys were made in the state of Himachal Pradesh during which frequent visits were made in and around the orchid rich forest belts. Based on the observations, the present communication provides an account of 25 species of medicinally important orchids from the state along with brief notes on their habit, distribution and flowering period and medicinal uses. Many of these are still in use in traditional medicinal systems, especially in the tribal regions.

870. **Prakash, V. & Aggarwal, A. 2010.** "Traditional uses of ethnomedicinal plants of lower foot-hills of Himachal Pradesh- I". *Indian J. Tradit. Knowl.* 9(3): 519–521.

Abstract: The paper documents the traditional knowledge of medicinal plants that are used by the indigenous villagers residing in remote foot-hill areas of Himachal Pradesh in household remedies. An ethnobotanical survey was conducted on lower foot-hills of Himachal Pradesh during 2007-2008. About ten different ethnobotanical plant species were recorded for their medicinal uses and for other remedial purposes by the local inhabitants. There were seven families of which Asteraceae and Amaranthaceae families were mostly exploited by the people. *Abrus precatorius* is found vulnerable in Hamirpur district due to its excessive exploitation for various purposes by the local contractors. *Crotolaria juncea* is not only used as medicinal plant but it is also used as green manure in the fields. During survey, it is also found that some plant species such as *Abrus precatorius, Eclipta alba, Deeringia amaranthoides* and *Physalis minima* require *in-situ* as well as *ex-situ* conservation in the area for maintaining future germplasm source.

871. **Radha & Puri, S. 2018.** "Study of ethnomedicinal plants used by migratory shepherds in Renuka forest division of district Sirmour (H.P.) Western Himalaya". *Bio Bull.* 4(2): 103–109.

Abstract: The present study was carried out during 2017 to 2018 to obtain the information on ethnomedicines used by migratory shepherds in Renuka Forest Division in district Sirmour of Himachal Pradesh in western Himalaya. Renuka Forest Division lied in between 30°52'16" to 30°31'11" N latitudes and 77°17'34" to 77°47'38" E longitudes. Shepherds migrate in the month of July from their originated villages to Sirmour ranges (low hills). The geographical area of the Renuka Forest Division is 1018 km. The whole range of Renuka Forest Division is hilly and varies in elevations from 620 to 3647 m msl. Most of the tribal population lives near to forest area and they use various plant species for their basic needs such as food, fodder, wood and medicines to treat several diseases. Importance of wild medicinal plants in traditional healthcare practices provides clues to new areas of research. The present survey is focused on the traditional uses of wild medicinal plants by migratory shepherd. Information on wild medicinal plants of the present survey has been gathered through personal field visits, interviews, discussion and through pretested questionnaire. A total of 21 medicinal plant species were reported viz., *Cannabis sativa, Rhododendron arboretum, Vitex negundo* and *Zanthoxylem armatum*, etc. are the commonly used species. It was recorded that herb species were markedly high (12) followed by tree (5), shrubs (3) and climber (1). This survey can help as baseline data on wild medicinal plant species and could be helpful in conservation of this significant resource as well as traditional knowledge of migratory shepherds in study area.

872. **Rajasekaran, A. & Singh, J. 2009.** "Ethnobotany of Indian horse chestnut (*Aesculus indica*) in Mandi district, Himachal Pradesh". *Indian J. Trdit. Knowl.* 8(2): 285–286.

Abstract: *Aesculus indica* Coleb. ex Wall. (Hippocastanaceae), known as Himalayan chest nut or Indian horse chestnut is a large tree, distributed in the Himalayas from Kashmir to Nepal. The tree is locally known as *Khanor* in Himachal Pradesh and its parts are used in day-to-day activities as fodder, medicine and timber. A flour, locally known as *Tattwakhar* is prepared from the seeds of the tree. In the paper, detailed ethnobotanical information on the tree collected from Chuwar valley of Mandi district of Himachal Pradesh along with traditional method of preparation of *Tattwakhar* flour is presented.

873. **Rajasekaran, A. & Kumar, N. 2009.** "*Rasont*– A traditional crude drug prepared from *Berberis* sp. and its uses". *Indian J. Trdit. Knowl.* 8(4): 562–563.

Abstract: *Rasont* (locally known as *rasaunt* or *rasanjana*) is a crude, concentrated extract prepared from the roots and stem bark of several species of *Berberis* L. Traditionally, the village folks prepare the crude extract and use it to cure several ailments. The paper describes the indigenous method of preparation of *rasont* and its uses in Solan and Shimla districts of Himachal Pradesh.

874. **Rana, D. 2018.** "Phylogenetic exploration of *Acacia nilotica*: A commonly used medicinal mlant in Himachal Pradesh". *Biol. Forum- An Int. J.* 10(1): 69–74.

Abstract: *Acacia nilotica* belongs to family, Fabaceae. This family is known to contain highest number of species. The genetic diversity and relationship of six samples of *Acacia nilotica* collected from different geographical regions of Himachal Pradesh, was studied. The regions selected for the analysis were: Solan, Sirmour, Mandi, Bilaspur, Una and Hamirpur. Using RAPD analysis, a total of 12 arbitrary primers were screened while 7 primers showed amplifications. Out of total 68 bands, total 7 monomorphic and 61 polymorphic bands were scored. The percentage of polymorphism shown by the primers was 89%. The genetic diversity was estimated by constructing dendrogram using UPGMA method. The six samples of *Acacia nilotica* were divided into two major clusters. The genotypes of Mandi district showed 44% similarity with the genotypes of Bilaspur district. The genetic similarity between genotypes of Sirmour, Mandi, Bilaspur, Una was 30.2%. The present study revealed that the variation exists among the different accessions of *A. nilotica*, which can be further utilized for the production of quality herbal formulations.

875. **Rana, D. & Kumar, N. 2017.** "The documentation of medicinal plants (Fabaceae family) in Hamirpur district (H.P.) as pharmaceutical/herbal drugs". *CPUH Res. J.* 2(2): 17–25.

Abstract: The Fabaceae, commonly known as the legume, pea, or bean family, are a large and economically important family of flowering plants. The family is widely

distributed, and is the third-largest land plant family in terms of number of species, behind only the Orchidaceae and Asteraceae, with about 751 genera and some 19,000 known species. The members are distributed in the temperate regions of both northern and southern hemisphere. In India, the family is found both on hills and plains. The medicinal plants have been very important to mankind. The importance of medicinal plants becomes more patent at the present time in the developing countries. Although the use of bioactive natural products as herbal drug preparations dates back hundreds, even thousands, of years ago, their application as isolated and characterized compounds to modern drug discovery and development started only in the 19th century. It has been well documented that natural products played critical roles in modern drug development. This work presents a study of the importance of natural products, especially those derived from Fabaceae family in Hamirpur district (H.P.), in terms of drug development. It describes the main strategies for obtaining drugs from natural sources, fields of knowledge involved, difficulties and perspectives and therapeutic resources.

876. **Rana, D. & Masoodi, H.U.R. 2014.** "Ethno-botanical survey for wild plants in fringe villages around Shimla". *J. Appl. & Nat. Sci.* 6(2): 720–724.

Abstract: In this study an ethno-botanical survey was carried out in the fringe villages located at the periphery of Shimla Water Catchment Sanctuary. As the sanctuary area is not completely fenced the villagers have an access inside the sanctuary. An attempt was made to prepare a document of important flora and information from local community about their ethnic uses. The indigenous knowledge of local traditional uses was collected by personal interviews during field trips. Plants with their correct nomenclature were arranged by family name, vernacular name, part use, ethno-botanical remedies and uses. Plants having uses in medicine, ornamental, fodder and many other were studied. The study was entirely focused on revealing the medicinal potential possessed by the plants growing wild in this area and their sustainability for the betterment of mankind.

877. **Rana, D., Bhatt, A. & Lal, B. 2019.** Ethnobotanical knowledge among the semi-pastoral Gujjar tribe in the high altitude (Adhwari's) of Churah subdivision, district Chamba, Western Himalaya". *J. Ethnobiol. & Ethnomed.* 15: 10.

Abstract: The wild plants not only form an integral part of the culture and traditions of the Himalayan tribal communities but also contribute largely to the sustenance of these communities. The tribal people use large varieties of wild fruits, vegetables, fodder, medicinal plants, etc. for meeting their day-to-day requirements. The present study was conducted in Churah subdivision of district Chamba where large populations of Muslim Gujjars inhabit various remote villages. These tribal people are semi-pastoralists, and they seasonally (early summers) migrate to the upper altitudes

(Adhwari's) along with their cattle and return to permanent settlements before the onset of winters. A majorsource of subsistence of these tribal people is on natural resources to a wide extent, and thus, they have wide ethnobotanical knowledge. Therefore, the current study was aimed to report the ethnobotanical knowledge of plants among the Gujjar tribe in Churah subdivision of district Chamba, Himachal Pradesh.

878. **Rana, M., Rana, M., Sharma, D. & Chauhan, P. 2017.** "Commonly used medicinl plants in tehsil Bangana, district Una, Himachal Pradesh". *J. Ayurvedic & Herbal Med.* 3(2): 102–107.

Abstract: Himachal Pradesh is located in Western Himalaya, is a store house of medicinal plants. Most of the population lives in villages and use various plants for their basic needs such as food, fodder, wood and to treat various diseases. The present study is carried out in 7 villages of district Una of Himachal Pradesh located in the range of Shivalik Hills of outer Himalaya, regarding the ethno medicinal plants used by the locals in their own traditional health system. This study reveals the status of ethno-medicinal plants and their importance preserved by locals of distt. Una. The paper encompasses the 43 medicinal plants. These plants were collected from different villages of Una distt. and information was collected from local peoples.

879. **Rana, M.S. & Samant, S.S. 2011.** "Diversity, indigenous uses and conservation status of medicinal plants in Manali Wildlife Sanctuary, north Western Himalaya". *Indian J. Tradit. Knowl.* 10(3): 439–459.

Abstract: In the moutaineous regions human populations are dependent on plants for their sustenance particularly for medicine. In India, more than 95% of the total medicinal plants used in preparing medicines by various industries are harvested from wild. There is a great need to recognise the potential of bioresources at their fullest. Therefore, the present study focused to assess the medicinal plants diversity in Manali wildlife sanctuary of north western Himalaya, identify species preference, native, endemic and threatened medicinal plants and suggests conservation measures. A total of 270 medicinal plants belonging to 84 families and 197 genera were recorded. Maximum medicinal plants were reported in the altitudinal zone, 2000-2800 m and decreased with increasing altitude. Out of the total, 162 medicinal plants were native and 98 were endemic to the Himalayan region. Maximum species were used for stomach problems, followed by skin, eyes, blood and liver problems. Thirty seven species were identified as threatened. *Dactylorhiza hatagirea, Aconitum heterophyllum, Arnebia benthamii, Lilium polyphyllum, Swertia chirayita, Podophyllum hexandrum, Jurinella macrocephala, Taxus baccata* subsp. *wallichiana, etc.* were highly preferred species and continuous extraction from the wild for trade has increased pressure which may cause extinction of these species in near future. Identification of

active ingredients and mass multiplication of the potential species have been suggested in view of economic importance. Regular monitoring of populations and habitats of threatened medicinal plants, restricted harvesting and habitat protection are suggested.

880. **Rana, P.K., Kumar, P., Singhal, V.K. & Rana, J.C. 2014.** "Uses of local plant biodiversity among the tribal communities of Pangi Valley of district Chamba in cold desert Himalaya, India". *Sci. World J.* 2015: 1–15.

Abstract: Pangi Valley is the interior most tribal area in Himachal Pradesh of Northwest Himalaya. An ethnobotanical investigation is attempted to highlight the traditional knowledge of medicinal plants being used by the tribes of Pangi Valley. Various localities visited in the valley 2-3 times in a year and ethnobotanical information was collected through interviews with elderly people, women, shepherds, and local vaids during May 2009 to September 2013. This paper documented 67 plant species from 59 genera and 36 families along with their botanical name, local name, family name, habit, medicinal parts used, and traditional usage, including the use of 35 plants with new ethnomedicinal and other use from the study area for the first time. Wild plants represent an important part of their medicinal, dietary, handicraft, fuel wood, veterinary, and fodder components. These tribal inhabitants and migrants depend on the wild plant resources for food, medicines, fuel, fibre, timber, and household articles for their livelihood security. The present study documents and contributes significant ethnobotanical information from the remote high altitude and difficult region of the world, which remains cut off from rest of the world for 6-7 months due to heavy snowfall.

881. **Rana, S.B., Rana, M.S. & Samant, S.S. 2015.** Status and conservation of medicinal plants in a central part of Himachal Pradesh, North Western Himalaya. In: Sharma, P., Bharti, P.K. & Singh, N. (Eds.), *Medicinal Plants: Distribution, utilization and Significance*. Discovery Publishing House Pvt. Ltd., New Delhi, Pp. 17–47.

882. **Rana, T.S., Datt, Bhaskar & Rao, R.R. 1996.** "Strategies for sustainable utilization of plant resources by the tribals of the Tons valley, Western Himalaya". *Ethnobotany* 8: 96–104.

Abstract: The Tons Valley (parts of Shimla district of Himachal Pradesh and Dehra and Uttarkashi districts of Uttarakhand) in the Western Himalaya was extensively surveyed and an assessment of standing biodiversity in relation to the local inhabitants was made. The valley is largely occupied by 'Jaunsari' tribe who depend on their surrounding forest resources to supplement their day-to-day requirements. Indigenous knowledge of the tribals is inextricably linked with the biodiversity of the area. Over 800 species of flowering plants are estimated to occur in the valley, of which 40% species have been reported to be used for various purposes by the local people.

About 20 species are found to be extensively exploited, chiefly for medicinal purposes. The pressure of ruthless exploitation without adequate regeneration measures is endangering many useful species. Although sustainability of the resources is ensured by the local people, often over-exploitation of some medicinal plants, such as *Taxus baccata, Berberis* spp., *Zanthoxylum armatum, Acorus calamus, Cinnamomum tamala, Swertia chirayita, Centella asiatica, Asparagus racemosus, Berginia ciliata*, etc. is endangering the population of some of these species. The paper presents baseline data on the valley, magnitude of prevailing threats and strategies for sustainable utilization of the plant wealth of the area.

883. **Rani, Savita & Rana, J.C. 2014.** "Ethnobotanical uses of some plants of Bhattiyat block in district Chamba, Himachal Pradesh (Western Himalaya)". *Ethnobotany Res. & Appl.* 12: 407–414.

Abstract: In this study an ethnobotanical survey of plant diversity was carried out at Bhattiyat block of district Chamba, Himachal Pradesh, India. The study was mainly focused on the medicinal plants used for treatment of various ailments/diseases by the nearby village inhabitants. The information was collected by questionnaire and consulting local elders. The present paper provides information on the indigenous therapeutic application and other traditional uses of 22 plant species that are commonly used by the natives of Bhattiyat block of district Chamba.

884. **Rani, Savita, Chahota, R.K. & Sharma, Tilak Raj. 2015.** "Ethnobotanical survey and traditional knowledge of some medicinal and aromatic plants of Himachal Pradesh, North-West Himalayas". *Int. J. Appl. Pure Sci. & Agric.* 1(12): 1–22.

Abstract: The present study was focused on the analysis, documentation and interpretation of traditional knowledge and ethno-medicinal phyto-wisdom in four districts (Chamba, Kangra, Hamirpur and Mandi) of Himachal Pradesh. Himachal Pradesh, a hilly state of North-West Himalayas is a repository of aromatic and medicinal plants. A total of 47 plant species are reported as being used locally for various purposes. All of these plant species are collected from the wild, 7 of which are reported as rare locally. Four new ethnobotanical uses are reported in *Clematis grata, Indigofera hamiltonii, Pinus wallichiana* and *Polygonum persicaria* from different parts of the Himachal Pradesh for the first time. Our findings suggest that leaves are the major plant part used in most of the recipes. Majority of the recipes are prepared in the form of decoction from freshly collected plant parts. Mostly a single species is used and are mainly taken orally. Unsustainable collection methods, poor post harvest methods, soil erosion and intense deforestation are the main causes of the depletion of local flora. Local people still depends on medicinal plants for majority of their ailments, so loss of these plant resources will be certain extent to a hamper the existing healthcare system in the studied area.

885. **Rani, S., Rana, J.C. & Rana, P.K. 2013.** "Ethnomedicinal plants of Chamba district, Himachal Pradesh, India". *J. Med. Pl. Res.* 7(42): 3147–3157.

Abstract: Importance of medicinal plants in traditional healthcare practices provides clues to new areas of research and biodiversity conservation is now well known. However, information on the use of plants for medicinal purpose is lacking from many tribal areas of Himachal Pradesh. Keeping this in view, the present study was undertaken in a tribal dominated area of Chamba district, to look for the diversity of plant resources, used by local people for curing various ailments. Questionnaire surveys, field visits and participatory observations were planned to collect information about the uses of various plants. It was found that 50 plant species are being commonly used by local people to cure 26 diseases. In most of the cases, leaves (40%) followed by roots (24%) were used to cure many health problems. New medicinal uses of *Achyranthes bidentata, Cannabis sativa* and *Stellaria monosperma* were also reported for the first time.

886. **Rani, S., Rana, J.C., Jeelani, S.M., Gupta, R.C. & Kumari, S. 2013.** "Ethnobotanical notes on 30 medicinal polypetalous plants of district Kangra of Himachal Pradesh". *J. Med. Pl. Res.* 7(20): 1362–1369.

Abstract: District Kangra is the most populous district, located on the South-Western end of the Himachal Pradesh, a hilly state of the Western Himalayas. The geographical area of district Kangra is 5,739 km^2, making 10.31% of the total area of the state. The importance of medicinal plants in traditional health care practices, providing clues to new areas of research and in biodiversity conservation, is now well recognized. However, information on the uses of plants for medicine is lacking from many interior areas of district Kangra. Keeping this in view, the present study was initiated in a tribal vicinity of district Kangra. The study aimed to look into the diversity of plant resources that are used by local people for curing various ailments. It was found that 30 polypetalous plant species are commonly used by local people for curing various diseases. In most of the cases (34.37%), leaves were used for curing the various health problems.

887. **Rathore, Sumati, Shashni, Sarla, Samant, S.S. & Sundriyal, R.C. 2018.** "Indigenous uses of wild hemp (*Cannabis sativa*) by the local inhabitants in Manikaran valley of Himachal Pradesh, North Western Himalaya". *J. Non-Timber Forest Prod.* 25(3): 127–130.

Abstract: Current study deals with the use of wild hemp by the native communities of Manikaran valley, district Kullu of Himachal Pradesh in the North Western Himalaya. Data was collected during 2015 to 2017 through various field visits, questionnaire surveys, interviews with the locals and herb practitioners of the valley. Traditionally, the communities have being using the herb as medicine for treating various ailments like arthritis, abnormal menstrual disorder, wounds, sores, joint pain, sting pain and

recorded their usage pattern. Hemp plant fibres are used for making ropes, *pullan,* etc. Its seeds are also used for flavouring traditional foods like *Siddu/Aaksalu*. Further research is need to explore and harness the many other benefits of the herb.

888. **Rawat, D.S. & Kharwal, A.D. 2010.** "Ethnobotanical information on *Sapium insigne* (Royle) Benth.: A conserved plant of Shivalik hills, India". *Banglagesh J. Pl. Taxon.* 17(1): 97–99.

Abstract: In total 50 informants were interviewed in each district (Total 350) for one year in Shivalik hills (Kangra, Hamirpur, Una, Bilaspur and the lower parts of Mandi, Solan and Sirmaur). The highly poisonous component of the plant is latex as stated by the locals. People fear to cut this tree as if latex happens to fall in eyes which may cause serious troubles related to eyesight. So its cutting is done with utmost care by some people as they do not want this tree to be present along the borders of the fields as a safety measure. Latex contains fatty acid esters of tetracyclic diterpenes alcohols i.e. phorbol and derivatives of phorbol, diphnane and ingenane. The given information is the first ever report on *Sapium insigne*.

889. **Rawat, D.S. & Kharwal, A.D. 2010.** "Indigenous traditional method for making liquid detergent 'Chhoa' from *Zea mays* Linn. in Shivalik Hills (Himachal Pradesh), India". *Ethnobot. Leafl.* 14: 5–7.

Abstract: In the past, herbal liquid detergent was in regular use but with modernization this traditional indigenous knowledge depleted and at present is in use to a limited extent in some rural pockets of Shivalik hills. Dried maize (*Zea mays* Linn.) stems are burnt to ash and are put into a bamboo basket with a bottom layer of paddy straw. After pouring boiling water over ash, herbal liquid detergent is obtained as a final product. It is eco-friendly and a classic example of sustainability concept.

890. **Rawat, D.S. & Kharwal, A.D. 2011.** "Traditional health practices by 'Kinners'-A tribe in Alpine and sub-Alpine Himalayas of Kinnaur (Himachal Pradesh), India". *Life Sci. Leafl.* 22: 1048–1055.

891. **Rawat, D.S. & Kharwal, A.D. 2012.** "Plants used as galactagogue (veterinary) by 'Gijjars' of Shivalik Foot hills, Himachal Pradesh, India". *Pl. Archives* 12(2): 653–657.

Abstract: Livestock economy forms a major part of "Gujjar" tribe in Shivalik hills (Himachal Pradesh). "Gujjars" eke out their livelihood through the sale of milk and milk products and still depend upon plants for enhancing milk production in buffaloes. As milk and milk products are the major part of their economy, so plants used as galactagogue (veterinary), are the heart of discussion. "Gujjars" keep on migrating from low to high and high to low altitudes in search of pastoral lands (ghasnies) of Shivalik hills. Migratory "Gujjars" are also encountered during rainy season as they get ample amount of fodder in rainy seasons. This paper throws light on some

indigenous ethno-veterinary plants used as galactagogue. These plant uses are very unique as "Gujjars" use these plants and also pay attention for their conservation for future use; thus forming a stable sustainable system. Present study deals with 35 plants used as galactagogue belonging to 15 families along with their ODA (Observed density availability), Phenological pattern and TIV (Total importance value).

892. **Rawat, D.S. & Kharwal, A.D. 2013.** "Studies on traditional herbal paediatrics practices in Jaisinghpur, district Kangra (Himachal Pradesh, India)". *Global J. Res. Med. Pl. & Indigenous Med.* 2(4): 219–230.

893. **Rawat, D.S. & Kharwal, A.D. 2014.** "Ethnobotanical studies in weed flora in Shivalik Hills, Himachal Pradesh, India". *Int. J. Advanced Res.* 2(5): 218–226.

Abstract: Ethnobotanical studies has great value in enhancing our knowledge about plants used by native communities and means adopted by them for its conservation. Wild plants meet most of the requirements for men and his domesticated animals. Weeds are troublesome as they reduce the crop yield and detract from the comfort of life. Inspite of all this, some of the weed are highly medicinal, edible and has great ethnobotanical values. Present study includes ethnobotanical importance of 42 weeds (41 dicots and 1 monocot) belonging to 18 families. The leaves and aerial parts of 11 spp., seeds of 5, roots of 4, stem of 3, flowers, roots and fruits of 2 spp. each are used while 4 spp. are used as whole plant. 30 weeds are medicinally important while 20 are edible, 3 are refrigerant and 6 weeds are used for other purposes.

894. **Rawat, D.S., Kharwal, A.D. & Rawat, S. 2009.** "Ethnobotanical studies on dental hygiene in district Hamirpur, Himachal Pradesh (H.P.), India". *Ethnobot. Leafl.* 13: 1434–1342.

Abstract: The present study was carried out to assess and document ethnobotanical knowledge of plants of district Hamirpur (H.P.) used for dental care, as the area has diverse flora and high ethnobotanical potential. It was found that 32 different plant species belonging to 24 families were used for dental hygiene. The studies reveal the use of 18 trees, 9 shrubs, 2 under-shrubs and 5 herbs for dental hygiene.

895. **Rawat, R.S., Jishtu, V. & Kapoor, K.S. 2009.** "Medicinal and aromatic plant diversity of Himalayan Cold Desert with reference to Spiti valley of North-west Himalayas". *Indian Forester* 135(7): 891–904.

Abstract: A number of floristic surveys were conducted in different localities of cold desert in Spiti valley of North-West Himalayas for documenting the medicinal and aromatic plant diversity. A total of 118 medicinal and aromatic plant species have been recorded, which were low in occurrence and sparsely distributed. They were also under threat mainly due to over exploitation, unscientific collection and overgrazing.

896. **Rawat, Y.S., Vishvakarma, S.C.R. & Todaria, N.P. 2009.** "Fuelwood consumption pattern of tribal communities in cold desert of the Lahaul valley, Northwestern Himalaya". *Biomass & Bioenergy* 33(11): 1547–1557.

Abstract: Fuel wood is the primary source of energy in rural areas of the Himalaya. Lack of resources, extremely low temperature and xeric climatic conditions of the study region (Khoksar – 3200 m, Jahlma – 3000 m, Hinsa – 2700 m and Kuthar – 2600 m) of cold desert of the Lahaul valley has led to serious deforestation due to excessive use of fuel wood in the past. On the basis of family sizes, fuel wood consumption was recorded less in large family as compared to small family. The fuel wood is used for various activities such as cooking, water heating, room heating, lighting and livestock rearing, *etc*. Fuel wood consumption was highest in high altitude villages as compared to low altitude villages irrespective of family size. Fuel wood consumption of 4.32 ± 0.99 kg/capita/day was highest at Khoksar for small family during winter season followed by the autumn (2.25 ± 0.15 kg/capita/day) and summer (1.38 ± 0.13 kg/capita/day). The labour energy expenditure for fuel wood collection was also highest for Khoksar (91.91 MJ/capita/year), followed by Hinsa (61.29 MJ/capita/year), Kuthar (52.01 MJ/capita/year) and Jahlma (51.89 MJ/capita/year), respectively. It was found that fuel wood consumption in the study region was influenced by the local cold climate and season of the year. The present information on fuel wood consumption pattern at different altitudes would be helpful in designing appropriate technologies to develop energy plantations in the region.

897. **Saini, J.S. & Sood, S.K. 2017.** "An ethnomedicinal plant study in fringe villages of Col. Sher Jung National Park, Simbalbara, Sirmour, H.P., India". *CPUH Res. J.* 2(2): 1–16.

Abstract: A series of preliminary research attempt have been initiated in ethnobotany in the Western Himalaya from last three decades. But Col. Sher Jung Park, Simbalbara and its surroundings although rich in plant diversity still excluded in particular. This protected area having altitudinal variation between 350-700 m with mean annual rainfall of 1260 mm. Present study was planned to collect information of plants used by inhabitants in and around Col. Sher Jung National Park, Simbalbara. Field surveys were conducted during January 2010 to December 2016 in different season to collect data on ethnobotanically important plants from villagers and traditional healers. Total 214 plant species belonging to 69 families were documented having medicinal importance. Among the families recorded Fabaceae was the largest with altogether 26 species followed by Poaceae (12 species), Euphorbiaceae (11 species), Rutaceae (10 species), Lamiaceae and Moraceae with 9 species each. Traditions, customs and cultural rights play a key role in protection of biodiversity and environment. Hence, there is immense need to utilize the ethnobotanical information and promote the indigenous people being playing a key role in conserving the biodiversity in real sense.

898. **Sakshi. 2009.** *Eco-ethnobotanical Assessment and Conservation Priorities of Floristic Diversity along an Altitudinal Gradient in Central Part of Himachal Pradesh.* Ph.D. Thesis, Kumaun University, Nainital, India (Unpublished).

899. **Samant, S.S. & Pant, S. 2006.** "Diversity, distribution pattern and conservation status of the plants used in liver diseases/ailments in Indian Himalayan region". *J. Mountain Sci.* 3(1): 28–47.

Abstract: In the Indian Himalayan Region, the studies focused on diversity of the plants used for treating liver diseases/ailments have not been carried out so far. Therefore, the present attempt has been made to study the diversity, distribution pattern and conservation status of the plant species used for treating liver diseases/ ailments in that region. The present study is based on the intensive review of available information on medicinal plants for the IHR, and also based on the surveys conducted in parts of the Trans, Northwest and West Himalaya, i.e., parts of Himachal Pradesh and Uttaranchal State. A total of 138 species (35 species of trees, 22 shrubs and 81 herbs) belonging to 98 genera in 60 families have been recorded. Amongst the families, Euphorbiaceae (9 species), and altitudinal zone given. Assessment of the populations of threatened species, development of an appropriate strategy, action plan for the conservation and sustainable utilization of such components of plant diversity are suggested.

900. **Samant, S.S., Pant, S., Singh, M., Lal, M., Singh, A., Sharma, A. & Bhandari, S. 2007.** "Medicinal plants in Himachal Pradesh, north western Himalaya, India". *Int. J. Biodiv. Sci. & Manage.* 3(4): 234–251.

Abstract: Himachal Pradesh, in the Indian Himalaya, has a rich diversity of medicinal plants, which are widely used. This paper brings together existing information with the results from recent field surveys. A total of 643 species of medicinal plants are identified; many different plant parts are used for the treatment of various ailments. The number of medicinal plant species decreased with increasing altitude. The plants are classified according to nativeness, endemism, and rarity, and prioritized for cultivation. Existing strategies for *in-situ* and *ex-situ* conservation, cultivation and propagation are reviewed and a range of actions for cooperative implementation by all stakeholders are suggested

901. **Savitri & Bhalla, T.C. 2007.** "Traditional foods and beverages of Himachal Pradesh". *Indian J. Tradit. Knowl.* 6(1): 17–24.

Abstract: Himachal Pradesh presents anthropological, cultural, environmental and topographical diversity. Its reflection is seen in the variations of architecture of houses, clothing styles, food and food habits. The variations in availability of raw materials, environmental conditions clubbed with the time tested traditional knowledge and

wisdom have made the people of different regions of this hill state to formulate, develop and perpetuate the consumption of a wide range of traditional foods and beverages unique to its places since ages. Bhatooru, siddu, marchu, seera, chilra, manna, aenkadu, sepubari, patande, doo, baari, dosha, malpude, babroo, bedvin roti, madrah, tchati, churpa, sura, chhang, kinnauri, angoori, chulli, lugri, arak/ara, rak, chukh and pickles (e.g. brinjal, lingri, bidana, peach, pear, plum, tomato, bottle gourd, etc.) made from different fruits and vegetables, etc. are some popular traditional products that are unique to the tribal and rural belts of Himachal Pradesh. Some of these products, e.g. bhatooru, chilra and tchati constitute staple food in rural areas of the state while others are prepared and consumed during marriages, local festivals and special occasions, and form part of the sociocultural life of hill people. However, the production of these foods and beverages is largely limited to household level.

902. **Savitri, Monika, Kumari, A., Angmo, K. & Bhalla, T.C. 2016.** "Traditional prickles of Himachal Pradesh". *Indian J. Tradit. Knowl.* 15(2): 330–336.

Abstract: The traditional pickles of indigenous fruits and vegetables, *viz*., *galgal*, *lingri*, *aaroo, plum*, *lasura*, *dehu*, *kachnar* and *beedana* are popular in rural and urban areas of Himachal Pradesh since the very early times. These are used as appetizers and served practically with every meal. The traditional pickles of Himachal Pradesh are unique in the raw material, method of preparation and taste from the pickles in other parts of country. In the present study, the methods of preparation of traditional pickles as practiced by the rural folk have been documented.

903. **Sehgal, Anju Batta. 2015.** "Diversity of medicinal plants in Hamirpur district of Himachal Pradesh, India". *Phytotaxonomy* 15: 118–128.

Abstract: The use of plants as medicines predates written human history. Ethnobotany (the study of traditional human uses of plants) is recognized as an effective way to discover future medicines. Himachal Pradesh, one of the pioneer Himalayan states is a rich repository of medicinal flora. People of the state inherit a wide range of traditions, dialects, beliefs and cultures. Indigenous communities living in the state rely to a large extent on native plant species for curing various ailments. Hamirpur district of Himachal Pradesh is richly endowed with a large variety of plant species, many of which have medicinal properties. A large proportion of the rural population in the region depends on locally available medicinal plants to meet their health care requirements. The study aims at documenting medicinal plant diversity in Hamirpur district of Himachal Pradesh. The state boasts of a wide diversity of plant forms of Mediterranean, West Asian, Tibetan, Japanese and Myanmarese elements in its sub-tropical, temperate, alpine and cold desert regions. A number of diverse ethnic communities such as Gaddies, Gujjars, Kinnaurs or Kananrs, Jads, Lahaulis, Spitians,

Pangwals and Swangalas with distinct differences in socio-economic and socio-cultural conditions inhabit the region. These communities have special contributions and significance in protection of ecosystems and bio-resources of the region. Medicinal plants constitute a major segment of the flora throughout the world which provides raw materials for use in the pharmaceuticals, cosmetics and drug industries.

904. **Sen, Tara & Samant, S.S. 2013.** "Diversity, distribution and indigenous uses of medicinal plants in Rissa Khad watershed of district Mandi, Himachal Pradesh". *J. Non-Timber Forest Prod.* 20(3): 199–214.

Abstract: Present study has been focused on assessment diversity, distribution and indigenous uses of medicinal plants in Rissa Khad watershed of district Mandi, Himachal Pradesh. A total of 546 medicinal plants belonging to 125 families and 393 genera were recorded. These species are distributed between 700-2150 m. Of the total medicinal plants recorded, 92 species were native and 36 species near endemic to the Indian Himalayan Region (IHR). Two species, i.e. *Pimpinella acumianata* and *Pittosporum eriocarpum* were endemic to the IHR. Maximum species were used for skin diseases followed by wounds and injuries, dysentery, stomach problem, headache, eye diseases, cough, asthma, tonic, snake bite, teeth problem, cold boils, abortificent, rheumatism, sores and piles, respectively. The continued over exploitation and habitat degradation of some of the commercially viable species may lead to their extinction from the wild in near future. Ecological assessment of the native, endemic and commercially viable species, investigation of active ingredients, mass multiplication of native, endemic and commercially viable medicinal species through conventional (vegetative and seeds) and *in-vitro* (Tissue culture) methods, and establishment in natural habitats (*in-situ* conditions) and *ex-situ* conditions, and promotion of education and awareness among the inhabitants for the conservation and sustainable utilization of medicinal plants have been suggested.

905. **Seth, M.K. & Thakur, Poonam. 2013.** "Sacred plants used in Phagli festival of Malana village in Kullu, Himachal Pradesh". *Ethnobotany* 25: 83–88.

Abstract: Village Malana in Kulli district of Himachal Pradesh has been subjected to all sorts of investigations and has been described in newspapers and magazines as the Republic of Malana; a little Greece in Malana; the Drug Mafia in Malana; do's and don'ts in Malana, etc. Persistent and adamant efforts by the local inhabitants to retain their unique age-old heritage, the Malanis over the centuries have learnt to live in tune with nature. The civilized modern world has a lot to learn from the '*Malanis*'. In the present paper nine ethnobotanically important plant species of Malana village are enumerated along with their common names, vernacular names, family, place of collection and local uses.

906. **Shabnam, S.R. 1964.** "Medicinal plants of Chamba". *Indian Forester* 90(1): 50–63.

Abstract: Some of the medicinal plants found in the Chamba district of Himachal Pradesh have been listed after field observations for about three years. The plants have been divided into two groups, namely, (i) Commercially Important Species (45 species) and (ii) Species with Local or Potential Demand (200 species). In the case of the former group distribution of species, extent of trade, active principles and uses have been briefly given, whereas in the case of the latter group distribution only based on climatic zones has been indicated with the object of providing a rough guide to these interested in their exploitation.

907. **Shah, N.C. 2011.** "Ethnobotany of *Grewia optiva*, 'Hay tree' from Himalayan region". *Ethnobotany* 23: 86–88.

Abstract: *Grewia optiva* known as 'Hay tree', is locally recognised under different names, '*Biul*', '*Bhine*', "*Bhimal*' in the Himalayan region. The leaves and young branches are used as hay during winters when, no other grass or fodder is available for cattle. Its various parts are used differently in different regions of the Himalayas. The leaves contain high protein which increases the yield of milk in cattle. The communication deals with the botany, ethnobotany under different vernacular names.

908. **Sharma, A., Santvan, V.K., Sharma, P. & Chandel, S. 2014.** "Studies on traditional knowledge of ethnomedicinal plants in Jawalamukhi, Himachal Pradesh, India". *Int. Res. J. Biol. Sci.* 3(10): 6–12.

Abstract: Himachal Pradesh, a western Himalayan state is a rich store house of medicinal plants. The people of the state have great faith in effectiveness of medicinal herbs. This traditional system of medicine is fast disappearing due to relatively low income in this tradition and scarcity of written documents. The present study was carried out to explore traditional medicinal knowledge of plants of Jawalamukhi shakti peeth, Himachal Pradesh. It was found that 25 different plants belonging to 20 families are used to treat various diseases.

909. **Sharma, B. & Maheshwari, S. 2005.** "Traditional medical practices of Gaddi tribes in Kangra district, Himachal Pradesh". *Indian J. Tradit. Knowl.* 4(2): 169–172.

Abstract: The tribal people of Himachal Pradesh living close to forests and facing unfavourable climatic conditions have rich traditional knowledge, which was documented and tested on scientific scale and mostly recommended for further research. Traditional practices followed by the Gaddi tribes in Kangra district of Himachal Pradesh to cure pinworm and diarrohoeal problems among infants have been discussed.

910. **Sharma, B., Sharma, S., Bharadwaj, S.K., Ndungu, C.K. & Dutt, B. 2015.** "Etnobotanical uses of common plant species along the National Highway 5 from

Solan to Shimla in Himachal Pradesh". *World J. Pharm. & Pharmaceut. Sci.* 4(2): 1210–1218.

Abstract: An ethnobotanical survey was conducted during 2013-2014 to document the traditional knowledge of medicinal plants that are used by the local communities residing along the National Highway 5 from Solan to Shimla in Himachal Pradesh in household remedies for the treatment of diseases. About 25 different plant species were recorded which were used for their medicinal values and for other remedial purposes by the local inhabitants. The common uses of the selected plant species were compiled in the form of a table along with their vernacular names and the names of the respective families of the plant species.

911. **Sharma, B.D. 2002.** "Diversity, distribution and bio-prospecting of medicinal and aromatic plants of Himachal Pradesh". *Ann. Forest.* 10(1): 21–27.

Abstract: The state of Himachal Pradesh is endowed with high diverse ecological conditions in the lap of North-western Himalayas. The four ecological zones have a vast potential of hosting a wide variety of medicinal and aromatic plant species. Three hundred medicinal and aromatic plants have been listed to exit in these four zones. In the absence of right policies and planning for conservation of these plant species, a large number of these plants are becoming threatened or even have become extinct. The cultivation and bio-prospecting of medicinal and aromatic plants are good options to improve economy of people and provide quality drugs to meet growing health problems in the year to come.

912. **Sharma, B.D. & Rana, J.C. 1999.** "Traditional medicinal uses of plants of Himachal hills". *J. Econ. Taxon. Bot.* 23(1): 173–176.

Abstract: The present paper reports the ethnobotanical, Ayurvedic and Pharmacological uses of 27 plant species being used in rural areas in Himachal hills. Besides, four empirically well proven ayurvedic formulations are also being reported in the paper.

913. **Sharma, B.D. & Rana, J.C. 2000.** Traditional medicinal uses of plants of Himachal Pradesh Hills. In: Jain, S.K. (Ed.), *Ethnobotany and Medicinal Plants of Indian subcontinent.* Scientific Publishers (India), Jodhpur, India. Pp. 173–176.

914. **Sharma, B.D., Singh, Lal & Kaur, M.J. 2014.** "Traditional soap and detergents yielding plants and animal materials of Himachal Himalaya". *J. Non-Timber Forest Prod.* 21(2): 75–80.

Abstract: Traditional use of organic materials as soaps and detergents indicates the wisdom of people about utilization of biodiversity in their surroundings. Himachal Himalaya represents a wide range of agro-ecological conditions where altitude varies from 900 m to over 3000 m. The three districts included in the study represent almost

all conditions. A total of 23 plant species and two animal byproducts had been used by the people as soaps and detergents. The processing techniques and chemical basis of some 17 materials have been mentioned. These materials may find way to develop skin and environment friendly natural products in future.

915. **Sharma, Kavita, Thakur, Ruchi & Devi, Asha. 2017.** "Ethnobotany of some wild plants of Hamirpur (H.P.)". *CPUH Res. J.* 2(2): 34–40.

Abstract: An ethno botanical survey was conducted in Hamirpur district of Himachal Pradesh during 2017. A total of 15 plants belonging to 14 genera of 13 families were reported to be of ethno- medicinal importance in this study area. This paper provides the information regarding the ethno botanical and ethno medicinal uses of 15 wild plants species.

916. **Sharma, Lipika, Samant, S.S. & Kumar, Ashish. 2017.** "Fuel yielding species of Cold Desert Biosphere Reserve in the Indian Trans Himalaya". *J. Non-Timber Forest Prod.* 24(1): 21–27.

Abstract: Fuel is major source of domestic energy and depends upon the type of species available in the area. The tribal communities of Cold Desert Biosphere Reserve (CDBR), Himachal Pradesh lead agro-pastoral lifestyle in which they heavily depends on local resources for fuel wood. The available studies indicated that comprehensive study o fuel resource is not available for the CDBR. Therefore, an attempt has been made to (i) assess the diversity, distribution and utilization pattern of fuel resource, (ii) identify nativity and endemism of fuel representing trees (6 spp.), shrubs (37 spp.) and herbs (3 spp.). Caprifoliaceae and Salicaceae (8 spp. each) were the dominant families and *Lonicera* (8 spp.) and *Salix* (7 spp.) were species rich genera. Maximum species were found in the 3000-4000 m zone. Amongst fuel species, C*aragana versicolor, Kracheninnikovia cerastoides, Lonicera spinosa* and *Salix* spp. were the most preferred species from pastures for fuel wood. Only 22 species were native to the Himalayan region, 1 species, i.e. C*otoneaster gilgitensis* was endemic and 10 species were near endemic. Assessment of fuel species using ecological method (quadrat) study the extraction trends, develop conventional propagation protocols for mass multiplication and their establishment in the *in-situ* and *ex-situ* conditions, and create awareness among the tribal communities have been suggested.

917. **Sharma, Lipika, Samant, S.S. & Kumar, Ashish. 2017.** "Fodder resources of Cold Desert Biospher Reserve in Trans Himalaya". *J. Non-Timber Forest Prod.* 24(2): 79–92.

Abstract: Livestock is one of the major sources of livelihood and vital part of the agriculture and economy for the inhabitants of Cold Desert Biosphere Reserve (CDBR) in the Indian Himalayan Region (IHR). The tribal communities are dependent on plant resources for fodder to feed the livestock. The review of literature revealed that focused studies on fodder resources of the CDBR have not been carried out so far.

Therefore, the present study attempts to specify 270 species of fodder representing trees (3 spp.), shrubs (24 spp.) and herbs (243 spp.). Poaceae (105 spp.) and Polygonaceae (34 spp.) were dominant families and *Poa* (18 spp.), *Carex* and *Polygonum* (11 spp. each), and *Festuca* (10 spp.) were species rich genera. Maximum species were found in the 3000-4000 m zone. Most collected fodder species from wild includes *Trigonella emodi, Cicer microphyllum, Aconogonum tortuosum, Clematis ladakhiana, Cousinea thomsonii, Carex infuscata, Festuca rubra, Leymus secalinus,* etc. Only 88 species were native to the Himalayan region, 11 species were endemic and 37 species were near endemic. Ecological assessment of the fodder species using quadrate method and rotational grazing of livestock by tribal communities and Gaddis; and development of management plan and policy briefs are suggested.

918. **Sharma, M. & Sood, S.K. 2013.** "Ethnobotanical survey for wild plants of district Solan, H.P. India". *Int. J. Environm. Biol.* 3(3): 87–95.

Abstract: An ethnomedicinal survey was carried out in district Solan, Himachal Pradesh, for documentation of important flora and information from local community about their ethnic uses. The indigenous knowledge of local traditional uses was collected through questionnaire and personal interviews during field trips. Plants with their correct nomenclature were arranged by family name, vernacular name, part use, ethnomedicinal remedies and ethnomedicinal uses. Screening of data was carried out based on the book entitled 'Dictionary of Indian Folk Medicine and Ethnobotany' by Jain (1991) and available ethnobotanical literature. A total of 115 plants species were identified by taxonomic description and locally by ethnomedicinal knowledge of people existing in the region. Plant having uses in medicine, ornamental, fodder and many other, were studied. Aim of present work is to accumulate knowledge regarding ethnic uses of plants so that they can be used for modern formulation of drugs in Ayurveda.

919. **Sharma, N. 2008.** "Indigenous medication used by Himachali women to cure pregnancy discomforts". *Indian J. Tradit. Knowl.* 7(4): 638–641.

Abstract: The research work is an effort to document and explore the indigenous knowledge of Himachali rural women used to cure various pregnancy discomforts. Although great strides have been made in bringing modern medicines to clinics in rural areas, indigenous /traditional medication continues to flourish in this region. It is, therefore, necessary for the scientific community to adequately document and validate this knowledge, so that it merges with the scientific stream of knowledge. The paper attempts to document and scientifically validate the indigenous practices followed by rural women to cure various pregnancy discomforts. The information regarding type of food preparation, method of preparation and consumption, etc. was gathered using questionnaire based survey along with informal discussions. It was observed

that for curing different pregnancy discomforts, various locally available plant parts are utilized. These plants possess certain medicinal properties, which provide the basis for further use. The data accrued is expected to serve as a tool for the development of herbal drug industries.

920. **Sharma, N. & Kumar, G. 2015.** "Exploration of some ethno-medicinal plants used by natives of Hamirpur District in Himachal Pradesh, India". *Asian Agri Hist.* 19(2): 95–104.

Abstract: The present research work was carried out in eight villages of Hamirpur district of Himachal Pradesh to study application of plants at home level in treating various kinds of ailments. The information was documented using questionnaire and PRA (participatory rural appraisal) techniques with the help of village elders, key informants, and local healers. During the study, 23 plant species were identified to cure various diseases. These plant species are frequently used for treating diseases/ disorders like cold, cough, fever, headache, weakness, eye infection, toothache, diarrhoea, boils and wounds, eczema, rheumatism, arthritis, nose bleeding, asthma, gonorrhoea, leucoderma, urinary problems, snakebite, epilepsy, cirrhosis, heart problems, and tuberculosis. The wealth of novel insights into plant use and preparation will help to understand culturally important practices of curing various diseases and their incorporation into modern health care system.

921. **Sharma, N. & Singh, A. 2012.** "An Insight into Traditional foods of North-western area of Himachal Pradesh". *Indian J. Tradit. Knowl.* 11(1): 58–65.

Abstract: A survey of food practices of natives of North western part of the outer area of Himachal Pradesh revealed a wide range of variability in ethnic foods made of cereals, pulses, milk, and tubers. Some of the famous dishes include *Bhaturu, Babru, Beduan roti, Mithdoo, Seera, Madra, Sepubari, Kadi, Lasurae ki sabji, Bhruni ki sabji, Patrode*, etc. In addition to these conventional foods they use many types of uncultivated fruits and vegetables to supplement their diet. Simple indigenous methods are employed for processing and preparing these foods. The ethnic foods of the state not only exhibit a treasure of food heritage but it is an integral component of the state as some of the foods are specially prepared during marriages, local festivals and special occasions.

922. **Sharma, O.P. 1976.** Some useful wild plants of Himachal Pradesh. Himachal Pradesh University, Dept. of Botany and Plant pathology.

923. **Sharma, P. 2013.** "Study on medicinal resources of Protected Areas of Mandi district, North West Himalaya". *J. Ethnobiol. & Tradit. Med.* 118: 389–401.

924. **Sharma, P. & Devi, Usha. 2013.** "Ethnobotanical uses of biofencing plants in Himachal Pradesh, Northwest Himalaya". *Pakistan J. Biol. Sci.* 16:1957-1963.

Abstract: The aim of this study is to document the traditional knowledge on the utilization of biofencing plants of Himachal Pradesh, Northwest Himalaya. The study was imperative because of dearth in the data pertaining to biofencing plants in the study areas. The whole study area was stratified into three zones and a widespread field survey and random sampling method was adopted to assess the live fencing diversity of the region. The region occupies total 61 species. 10 (trees), 45 (shrubs), 4 (herbs) and 2 were climbers. These belong to the 25 families. Rosaceae, Fabaceae, Berberidaceae, Elaeagnaceae and Euphorbiaceae are dominant families. Among genera, *Berberis* and *Rosa* are dominant. Of the total, 55 species are medicinally important and among these 20% are used for stomach disorders; 17% (skin complaints), 14% (asthma), 11% (fever and joint pains), 3% (aphrodisiac and snake bite), 1% (anti-cancerous and nerve disorders). Ethnobotanical assessment showed that 33 of the recorded species are used as fuel, 20 (edible), 8 (fodder) and 4 (fiber and ornamental). This traditional knowledge of biofencing plants contributes to the conservation of biodiversity and provides resource of economic and ecological interest and also decreasing the pressure on forests. So there is need to encourage the practice of using plant species for fencing in this region.

925. **Sharma, P. & Samant, S.S. 2014.** "Diversity, distribution and indigenous uses of medicinal plants in Parbati valley of Kullu district in Himachal Pradesh, Northwestern Himalaya". *Asian J. Adv. Basic Sci.* 2(1): 77–98.

Abstract: In the remote areas of the Indian Himalayan Region, the inhabitants largely depend on medicinal plants for curing diseases and income generation. But, proper documentation of the medicinal plants has been poorly attempted. The value of medicinal plants in traditional healthcare practices provides clues to latest areas of research in biodiversity conservation. Keeping this in view, the present study has been conducted to study the diversity, distribution and indigenous uses of medicinal plants of Parbati valley in Kullu district of the Himachal Pradesh. A total of 402 species of medicinal plants belonging to 98 families and 266 genera were recorded and used by the inhabitants of the area for curing various ailments. These medicinal plants comprise of 34 trees, 301 herbs, 61 shrubs and climbers and ferns, 03 species each. Maximum medicinal plants were reported in the altitudinal zone, 1100-1800 m and decreased with increasing altitudes in the study area. Of the total medicinal plants, 207 were natives, 04 endemic and 44 near endemic. The continued over-exploitation, habitat degradation and changing environmental conditions may lead to the extinction of these species within a few years. Therefore, regular monitoring of population and habitats using standard ecological methods, development of conventional and *in-vitro* propagation protocols, establishment of species in *in-situ* and *ex-situ* conditions have been suggested.

926. **Sharma, P. & Samant, S.S. 2014.** "Assessment of fuel resource diversity and utilization pattern in Nargu Wildlife Sanctuary of Himachal Pradesh, NW Himalaya". *Int. J. Biodiv. Conserv.* 6(1): 17–27.

Abstract: Dearth in the studies related to the fuelwood collection trends, conservation and management has prompted the present work. Nargu Wildlife Sanctuary of Himachal Pradesh was assessed for the fuel resources because the region was not evaluated earlier and dependency of the stakeholders on the forest resources was soaring. In the twenty three villages studied, forty five species (33 trees and 12 shrubs) belonging to 23 families of fuel resource were recorded. In the three different altitudinal ranges of the area probability of use (PU) and resource use pattern (RUI) was studied and it was highest for *Quercus leucotrichophora* A. Camus (1879.30 kg/hh/year), followed by *Rhododendron arboreum* Sm. (433.57 kg/hh/year), *Cedrus deodara* (Roxb. ex D. Don) G. Don (425.22 kg/hh/year), *Myrica esculenta* Buch.-Ham. ex Don (385.05 kg/hh/year) and *Persea duthiei* (King. ex Hk.f.) Kostern. (370.96 kg/hh/year). Among the surveyed villages, maximum total collection (7992 kg/hh/year) was done in Mandra followed by Seri (7524 kg/hh/year) and Drun (7476 kg/hh/year) villages. Of the total, 33 species were native to the Himalayan Region, 06 species native to the Himalayan region and neighbouring countries and remaining species were non-natives. Major thrust of the study is to comprehensively manage the species highly-preferred for fuel, diversification of choice of species from natives to non-natives, and their large scale propagation.

927. **Sharma, P. & Samant, S.S. 2017.** "Diversity, distribution, indigenous uses and conservation of orchids in Parbati valley of Kullu district, Himachal Pradesh, Northwestern Himalaya". *J. Biodiv. & Endangered Sp.* 5(1): 177.

Abstract: The Indian Himalayan Region (IHR) is known as the repository of biodiversity. It supports 8,000 species of angiosperms. The Orchidaceae is among the dominant family of angiosperms and highly evolved family among the monocotyledon. The species of this family are facing tremendous pressure due to habitat degradation, over-exploitation and changing environmental conditions. Therefore, while exploring the floristic diversity of Parvati Valley, attempts have also been made to explore the orchid diversity and analyze for diversity, distribution patterns, nativity, endemism, threat categories and indigenous uses. Total 19 species of the orchids representing 13 genera were recorded between 1100-3600 m amsl. Of these, 13 species were natives, 6 species near endemic and 5 species non-natives. These species represented in grassland, shady moist, forests, alpine meadows, moist rocks and bouldary habitats. These species were used for curing various diseases/ailments by the inhabitants of the valley. Due to habitat degradation the populations of these species are decreasing fast. The over exploitation, habitat degradation and changing environmental conditions

of these species has led rapid population depletion. Therefore, appropriate strategy has been suggested for the conservation and management of these orchids.

928. **Sharma, P., Agnihotry, A. & Sharma, P.P. 2015.** "An ethnobotanical study of medicinal plants in Murari Devi and surrounding areas (Mandi district, Himachal Pradesh), India". *Indian Forester* 141(1): 68–78.

Abstract: Survey was conducted to study the diversity, utilization pattern and indigenous uses of floristic diversity in Murari Devi and surrounding areas of Mandi disrtict in Himachal Pradesh. Ethnobotanical uses of 220 plant species belonging to 184 genera and 88 families were recorded. These medicinal plants comprise of 31 trees, 134 herbs, 50 shrubs and 05 ferns. From the total, 35 were near endemic to Indian Himalayan Region (IHR). The present study represents an area specific approach.

929. **Sharma, P., Patti, P. & Agnihotry, A. 2013.** "Ethnobotanical and ethnomedicinal uses of floristic diversity in Murari Devi and surrounding areas of Mandi district in Himachal Pradesh, India". *Pakistan J. Biol. Sci*. 16: 451–468.

Abstract: Traditional uses of floristic diversity are the most important component of indigenous knowledge system, which is widely practised by human populations all across the world. Keeping this in mind, the present study has been conducted during 2010-2012, to study the ethnobotanical and ethnomedicinal uses of floristic diversity in Murari Devi and surrounding areas of Mandi district in Himachal Pradesh, India. Total 384 species (71 trees, 97 shrubs, 209 herbs and 07 ferns) belonging to 106 families and 285 genera were recorded and used by the inhabitants of the area. Different parts of these species, such as whole plants, leaves, flowers, fruits, roots, seeds, stems, barks, etc. were used by the inhabitants for curing various ailments. Various anthropogenic activities, over exploitation and habitat degradation have led rapid population depletion of these species. Therefore, study on habitat ecology, development of conventional and *in-vitro* propagation protocols, development of agro techniques/plantation techniques and introduction in the akin habitats, education and awareness programs for the inhabitants are suggested. So that adequate planning for the conservation of these species could be done.

930. **Sharma, P., Samant, S.S & Lal, M. 2015.** Diversity, indigenous uses, conservation prioritization and current status of medicinal plants in Himachal Pradesh: A case study from Chandra valley. In: Sharma, P., Bharti, P.K. & Singh, N. (Eds.), *Medicinal Plants: Distribution, Utilization and Significanc*e. Discovery Publishing House Pvt. Ltd., New Delhi, Pp. 1–16.

931. **Sharma, P., Samant, S.S. & Tewari, L.M. 2015.** "Diversity, distribution, indigenous uses and conservation of medicinal plants in Nargu Wildlife Sanctuary, North Western Himalaya". *J. Non-Timber Forest. Prod*. 22(4): 181–201.

Abstract: In the Indian Himalayan region the use of medicinal plants is still a tradition continued by local people or ethnic communities and Traditional Medicine Systems play an important role in daily health care of poor people. The use of plants as medicine is slowly increasing in the developed world because they have minor or no side effects. The present study was conducted in Nagru Wildlife Sanctuary of Himachal Pradesh as the total dependency of the stakeholders on nearby forests for medicinal resources. In the present study, we reported 371 plant species that are used by the local people in and around Nargu WLS as medicine. Distribution of maximum species (297 spp.) occurred between 1801-2800 m zone and only 40 species were present above 3800 m. Of the total medicinal species recorded, 163 species were native to the Himalayan region and 24 species native to the Himalaya and other biogeographically regions. Rests 184 species were non native. The most frequently cured disease category (108 spp.) was gastrointestinal disease. Stakeholders of the sanctuary and surrounding villages have rich indigenous knowledge of the use of medicinal plants to maintain their primary health. Traditional herbal remedies are important and effective because many traditional uses are scientifically proven through phytochemical and pharmacological studies. However, a large number of plant species remain untested for bio-efficacy and toxicity. Such tests may reveal novel remedies that have bioprospecting potential. Moreover, the study emphasizes the need for the conservation of such precious medicinal resources of the area by managing and conserving the natural habitats, checking unscientific exploitation and by applying *in-situ* and various *ex-situ* conservation methods.

932. **Sharma, P., Agnihotry, A., Sharma, P.P. & Sharma, L. 2013.** "Wild edibles of Murari Devi and surroundings areas in Mandi district of Himachal Pradesh, India". *Int. J. Biodiv. Conserv.* 5(9): 592–604.

Abstract: The wild edibles served as a dietary supplement and medicine for thousands of years, particularly in the tribal and rural areas of the Himalayas. A total of 43 wild edibles, representing 33 genera and 25 families were reported. Maximum number of species were reported in the altitudinal zone, 700 to 1800 m followed by >1800 m altitudinal zone. Forty species were found in dry habitat followed by shady moist degraded bouldary, etc. Fourteen species were native to Himalayan region and the rest were non-native to Himalayan region. Various parts of these wild edibles, that is, fruits, leaves, roots, bark, flowers, seeds, tubers, aerial parts, etc., were consumed by the inhabitants for various purposes. Mass scale cultivation of such wild edibles in the villages may reduce the human pressure on the wild habitats. Therefore, conservation measures have to be taken to maintain the current status of these habitats and species. The information generated in the present communication represents a valuable database that provides baseline information and contributes to filling the knowledge gaps for the compilation of a local biodiversity register of the study area, a key

instrument for achieving the regional and global biodiversity conservation and sustainable development goals.

933. **Sharma, Pankaj & Mishra, N.K. 2009.** "Ethno-medicinal uses and agro-biodiversity of Barmana region in Bilaspur district of Himachal Pradesh, Northwestern Himalaya". *Ethnobot. Leafl.* 13: 709–721.

Abstract: India is one of the richest countries in traditional knowledge, because of its ambient biodiversity, variety of habitats and rich ethnic divergence. Thus we have had well established local health tradition still relevant in indigenous healthcare system. The paper provides first hand information on the agro-biodiversity and ethno-medicinal uses of the area. In the present study 50 species belonging to 37 genera and 17 families i.e. shrub (1 spp.), tree (1 spp.), herb (48 spp.) were recorded under the agro-biodiversity region of the area. The utilization pattern of the species indicated that leaves of 22 species, stem of 1 species and seeds of 23 species, whole part of 11 species, tubers and flowers of 4 species, fruits of 18 species, each are used. 6 species were Indian origins, while others were non-native to Indian Himalayan region.

934. **Sharma, Pankaj & Mishra, N.K. 2009.** "Diversity, utilization pattern and indigenous uses of plants in and around cement factory in Bilaspur district of Himachal Pradesh, North-Western Himalaya". *Biol. Forum– An Int. J.* 1(2): 78–80.

Abstract: Studies to assess the diversity, utilization pattern and indigenous uses of plants in and around a cement factory in Barmana region of Bilaspur district in Himachal Pradesh were carried out from September, 2007 to July, 2008. A total of 217 species of plants belonging to 68 families and 160 genera were recorded. Among these ecologically and economically important species, shrub (42 spp.), tree (56 spp.), herb (119 spp.) were present. The species were used as medicine (85 spp.), wild edible/ food (86 spp.), fuel (54 spp.), fodder (71 spp.), ornamental (11 spp.) timber (9 spp.) and religious (5 spp.) by the inhabitants of the area. The paper gives scientific name of wild plants along with authority, local names, family, life form, indigenous uses and plant part used by the local people of the region. Different parts of these species, such as whole plants, roots (including rhizomes and tubers), leaves, flowers, fruits, seeds and stems are used by the inhabitants for curing various diseases.

935. **Sharma, Pankaj, Vidyarthi, Shalini & Mishra, N.K. 2010.** "Medicinal uses of plants in and around cement factory in Bilaspur district of Himachal Pradesh, North-Western Himalaya". *J. Non-Timber Forest Prod.* 17(4): 477–486.

Abstract: The Indian Himalayan Region (IHR) one of the mega diversity hotspot recognised as best habitat for various medicinal plants. Himachal Pradesh, the part of IHR has such a suitable habitat which is rich in medicinal plant diversity. The present communication highlights the medicinal plants used by the inhabitants in various ailment/ diseases of Barmana region of Bilaspur district of Himachal Pradesh, North-Western

Himalaya. Information on 63 species of medicinal plants belonging to 35 families and 57 genera were recorded. Among these plant species, shrub (20 spp.), tree (24 spp.), herb (19 spp.) were recorded. Different parts of these species, such as whole plants, roots (including rhizomes and tubers), leaves, flowers, fruits, seeds and stems were used by the inhabitants of the area for curing various diseases. Diseases like asthma, antifertility, cancer, cough and cold, fever, diarrhoea, dysentery, skin disorders, jaundice, rheumatism, etc. mostly treated with these plant species.

936. **Sharma, Pankaj, Vidyarthi, Shalini & Nath, Surinder. 2011.** "Study of medicinal phytodiversity of Janjehli, Rohanda and adjoining areas, Himachal Pradesh, North Western Himalaya". *J. Non-Timber Forest Prod.* 18(2): 141–148.

Abstract: The Indian Himalayan Region one of the mega diversity hotspot is recognized among the best habitat for various medicinal plants. Himachal Pradesh, situated in North-West Himalaya has a suitable habitat which is rich in medicinal plant diversity. Present survey on medicinal flora was done in Janjehli, Rohanda and adjoining areas of Mandi district of Himachal Pradesh.

937. **Sharma, Parveen K., Chauhan, N.S. & Lal, B. 2003.** "Commercially important medicinal and aromatic plants of Parvati valley, Himachal Pradesh". *J. Econ. Taxon. Bot.* 27(4): 937–942.

Abstract: India in general and Himalayas in particular are the reservoir of genetic wealth ranging from tropical, sub-tropical, sub-temperate to temperate including dry temperate and cold deserts; culminating into alpine- both dry and moist covering a great variety of flora and fauna. But, those genetic resources are threatened- a process switched on by the exploding human and cattle population, unsustainable resource extraction and unfriendly waste dumping. Many species have already disappeared or are in the process of extinction, designated as endangered species. Such disappearance of genetic resources is related to the extinction of innumerable species with which it is intrinsically linked through food webs and food chains. This has also lead to serious ecological consequences with an eventual bearing on productivity, which is affecting the basic life support system and livelihoods of millions of organisms living on the earth.

938. **Sharma, P., Agnihotry, A., Sharma, P.P. & Sharma, L. 2013.** "Wild edibles of Murari Devi and surrounding areas in Mandi district of Himachal Pradesh, India". *Int. J. Biodiv. Conserv.* 5(9): 580–592.

Abstract: The wild edibles served as a dietary supplement and medicine for thousands of years, particularly in the tribal and rural areas of the Himalayas. A total of 43 wild edibles, representing 33 genera and 25families were reported. Maximum number of species were reported in the altitudinal zone, 700 to 1800 m followed by >1800 m altitudinal zone. Forty species were found in dry habitat followed by shady moist

degraded bouldary, etc. Fourteen species were native to Himalayan region and the rest were non-native to Himalayan region. Various parts of these wild edibles, that is, fruits, leaves, roots, bark, flowers, seeds, tubers, aerial parts, etc., were consumed by the inhabitants for various purposes. Mass scale cultivation of such wild edibles in the villages may reduce the human pressure on the wild habitats. Therefore, conservation measures have to be taken to maintain the current status of these habitats and species. The information generated in the present communication represents a valuable database that provides baseline information and contributes to filling the knowledge gaps for the compilation of a local biodiversity register of the study area, a key instrument for achieving the regional and global biodiversity conservation and sustainable development goals.

939. **Sharma, P.K. 2002.** *Studies of phyto-diversity of medicinal and aromatic plants in Parvati Valley, Himachal Pradesh.* Ph. D. Thesis, Dr. Y.S. Parmar University, Nauni-Solan. (Unpublished).

940. **Sharma, P.K. & Chauhan, N.S. 2000.** Ethnobotanical studies of Gaddi- a tribal community of Kangra district, Himachal Pradesh. In: Kohli, R.K., Singh, H.P., Vij, S.P., Dhar, K.K., Batish, D.R. & Dhiman, B.K. (Eds.). *Man and Forest*. Punjab Univ., Chandigarh. Pp. 301–302.

941. **Sharma, P.K. & Lal, B. 2005.** "Ethnobotanical notes on some medicinal and aromatic plants of Himachal Pradesh". *Indian J. Tradit. Knowl.* 4(4): 424–428.

Abstract: Himachal Pradesh, which forms a part of the western Himalaya, is a repository of medicinal and aromatic plants and the traditional knowledge associated with these plants. Utilization of plant resources in their day-to-day life has been an age old practices of the people inhabiting this hilly state. The people living in remote and tribal areas still depend on household remedies for healthcare. The present paper provides information on the indigenous therapeutic application and other traditional uses of 9 plant species that are used by the natives of Himachal Pradesh. Information provided includes scientific name, family name (in bracket), vernacular names, distribution and ethnobotanical use clubbed with the common uses as recorded from the relevant literature.

942. **Sharma, P.K., Chaunhan, N.S. & Lal, B. 2004.** "Observations on the traditional phytotherapy among the inhabitants of Parvati valley in Western Himalaya, India". *J. Ethnopharmacol.* 92(4): 167–176.

Abstract: The present paper deals with the field observations recorded on the traditional indigenous therapeutic applications of the plants used by the inhabitants of the Parvati valley of Kullu district in western Himalaya of India. The Parvati valley is inhabited by different ethnic groups like Gujjars, Gaddis, Malanis, Kulluvis and others. These inhabitants have been dependent on the ambient plant resources for

food, fuel, fiber, timber, household articles and medicines to a great extent for ages. Even today a number of plants of the local flora are used for curing various ailments and diseases. First-hand information about 50 plant species belonging to 45 genera and 28 families were recorded during extensive field surveys carried in Parvati valley during 2000–2002. The information is given in a tabular form as scientific names of plants in alphabetic order followed by family and field numbers of the voucher specimens collected. Information on local/vernacular names of plants, uses, parts used, names of ailments and modes of usage are given in detail. Information on traditional uses and commercial uses as well as biological activities of the related species is included on the basis of the existing relevant literature so as to present a comprehensive account.

943. **Sharma, P.K., Chauhan, N.S. & Lal, B. 2005.** "Studies on plant associated indigenous knowledge among the Malanis of Kullu district, Himachal Pradesh". *Indian J. Tradit. Knowl.* 4(4): 403–408.

Abstract: The *Malani* is an ethnic community inhabiting a remote village generally called as Republic of Malana, located in Parvati valley of Kullu district, Himachal Pradesh. The adjoining area of Malana is inhabited by *Gujjars, Gaddis,* and other rural communities. Since ages, these people have been utilizing their ambient plant resources for food, fodder, fibre, medicine, fuel, and other purposes. During ethnobotanical surveys conducted in 2000-2002 among the *Malanis* and other inhabitants of Parvati valley, first hand information on 35 plant species was recorded. The uses in details are described in the present communication.

944. **Sharma, P.K., Sethi, G.S., Sharma, S.K. & Sharma, T.K. 2006.** "Ethnomedicinal observations among the inhabitants of cold desert area of Himachal Pradesh". *Indian J. Tradit. Knowl.* 5(3):358–361.

Abstract: The paper deals with the field observations of traditional phytotherapeutic applications used by inhabitants of Spiti valley, a cold desert in western Himalayas. The average land population ratio in the area is probably thinnest in the world. The Spitians (originally Mongolians) have been largely dependent on the plant resources for food, fuel, timber, household articles, and medicines to a great extent for ages. First hand information of about 26 plant species were recorded during extensive field survey carried out in cold desert area of Himachal Pradesh during 2003. The information covers scientific name, vernacular names, plant parts used and mode of usages.

945. **Sharma, P.K., Thakur, S.K., Manuja, S., Rana, R.K., Kumar, P., Sharma, S., Chand, J., Singh, A. & Katoch, K.K. 2011.** "Observations on traditional phytotherapy among the inhabitants of Lahaul valley through Amchi System of Medicine–A Cold Desert area of Himachal Pradesh in North Western Himalayas, India". *Chinese Med.* 2(3): 93–102.

Abstract: The paper highlights the phyto-diversity and indigenous uses an ecosystem existing in Lahaul valley of tribal district of Lahaul and Spiti in Himachal Pradesh, India. This is one of the most preferred tourist spot especially for foreigners. The cold desert area of India is known for its specific topography, sense climate and unique vegetation. The valley is rich in high value medicinal wealth and local inhabitants (Buddhist) practice the Tebetan Amchi System of Medicine. Keeping in view the continuous pressure on nature, this paper reflects the Phyto-diversity of Valley, with reference to medicinal and aromatic plants and conservation mechanisms to protect the valuable wealth of the valley and also suggests effective ecotourism planning of the study area.

946. **Sharma, S. & Rana, M. 2016.** "Commonly used medicinal plants in tehsil Pachhad, district Sirmour, Himachal Pradesh". *Pharma Tutor* 4(3): 34–38.

Abstract: Himachal Pradesh is located in Western Himalaya, is a store house of medicinal plants. Most of the population lives in villages and use various plants for their basic needs such as food, fodder, wood and to treat various diseases. The present study is carried out in district Sirmour of Himachal Pradesh, regarding the ethno medicinal plants used by the locals in their own traditional health system. This study reveals the status of ethno-medicinal plants and their importance preserved by locals of dist. Sirmour. The paper encompasses the 43 medicinal plants. These plants were collected from different villages of Sirmour dist. and information was collected from locals peoples.

947. **Sharma, Yogendra, Kumar, Arvind, Singh, Archna & Rana, J.C. 2008.** "Important medicinal plants and their uses in Me-Gad watershed area of Lahaul & Spiti". *J. Econ. Taxon. Bot.* 32(Suppl.): 116–122.

Abstract: Largely plant based, traditional medicinal systems continue to provide primary health care is more than three quarters of the world's population. Medicinal plants are locally used in treating and preventing specific ailments and diseases; people use these medicines deliberately on account of faith, the local myth, tradition and their socio-cultural milieu. The present paper highlights some important medicinal plants and their uses either alone or in combination with other plants/part(s) to treat various diseases in Me-Gad watershed area of Lahaul and Spiti district of Himachal Pradesh.

948. **Shashni, Sarla, Sharma, Sheetal, Rathore, Sumati, Samant, S.S. & Sundriyal, R.C. 2017.** "Traditional uses and potential to develop an enterprise of wild Rose species *Rosa brunoniin* syn. *R. moschata* in Kullu districtof North Western Himalaya". *J. Non-Timber Forest Prod.* 24(3): 137–140.

949. **Sidhu, M.C. & Thakur, S. 2015.** "Documentation of antidiabetic medicinal plants in district Mandi of Himchal Pradesh (India)". *Int. J. Pharm. Technol. Res.* 8(8): 164–169.

Abstract: A survey was carried out in district Mandi of Himachal Pradesh (India) to gather information related to the plants used for the management of diabetes. Documentation of this knowledge is important as it is vanishing gradually. The local people, traditional healers or vaidyas were interviewed by using a semi-structured questionnaire. A total of 25 plant species belonging to 17 families, mostly from Lamiaceae and Cucurbitaceae were used to treat diabetes. Maximum plants (28%) were trees followed by herbs and shrubs (24% each), climber (20%) and liana (4%). Fourteen species were found growing wild and leaves were the most commonly used plant part (40%). The medicinal preparations include juice, decoction, cooked, powder or paste form. All the formulations were prepared from single plant species. *Ajuga parviflora, Syzygium cumini, Eleusine coracana, Tinospora sinensis, Berberis aristata, Momordica charantia* were some of the most frequently used plant species. Three plant species i. e. *Clematis viginiana, Cornus capitata* and *Cucumis sativus* var. *hardwickii* have been reported for the first time as an antidiabetic.

950. **Sidhu, M.C. & Thakur, S. 2017.** "Ethnobotanical study of fodder plant resources in district Mandi, Himachal Pradesh". *Indian Forseter* 143(6): 595–601.

Abstract: The present study has been carried out in district Mandi (Himachal Pradesh) during 2012-2015. A total number of 78 angiosperm species belonging to 65 genera and 41 families were recorded as fodder. Poaceae was found to be the most dominating family followed by Moraceae, Fabaceae, Rosaceae, Salicaceae, etc. Among the all reported species, trees were the most commonly used (50%) followed by shrubs (21.79%), herbs (21.79%), lianas (5.12%) and climber (1.28%). Wild plant species constitute the major proportion of fodder i.e. 88.46%. About 10.25% herbaceous species were cultivated followed by 1.28% both wild and cultivated species. Various plant parts like leaves with young twigs, leaves, leaves with shoots, aerial parts, seeds or sometimes even the whole plant is used as fodder. Out of 78 plant species, 12 species were exclusively used as fodder whereas the remaining 66 were also used for other purposes. The species which are not traditionally fodder, can be evaluated further for their nutritional value and chemical composition.

951. **Singh, A., Lal, M. & Samant, S.S. 2009.** "Biodiversity, indigenous uses and conservation prioritization of medicinal plants in Lahual valley, proposed Cold Desert Biosphere Reserve, India". *Int. J. Biodiv. Sci. & Manage. 5*(3): 132–154.

Abstract: The Cold Desert of India is known for specific topography, severe climate and unique vegetation. The Lahaul valley in Himachal Pradesh, part of a proposed Cold Desert Biosphere Reserve, is rich in medicinal plants, and local people practice the Tibetan System of Medicine. A few studies are available on medicinal plants there are no integrated studies. A total of 354 medicinal plants, belonging to 208 genera and 76 families were recorded. The area ranges in altitude between 2801–

3800 m, and shady moist and forested habitats were identified as having the most medicinal plant species. The occurrence of near endemic, endemic, critically endangered, endangered, vulnerable and near threatened species indicates high anthropogenic pressure and that the area has high conservation value. Most of these species are commercially viable. An assessment of populations of threatened species using standard ecological methods, and notification of key areas as medicinal plants conservation areas is suggested. Also, mass reproduction for e*x situ* conservation and to ensure availability of quality planting material for cultivation, together with education and awareness programmes for large-scale cultivation are suggested.

952. **Singh, Archna & Kumar, Ajay. 2009.** "Medicinal plants being used by people in Bilaspur and Mandi districts of Himachal Pradesh". *J. Econ. Taxon. Bot.* 33(Suppl.): 149–156.

Abstract: The forest areas are endowed with plants having useful medicinal properties very well recognised by village and tribal people. Generally the village folk even now cure their ailments by treatments from such plants having medicinal value. This paper highlights some medicinal plants being exploited by the people of the area and by traditional healers in the Bilaspur and Mandi districts of Himachal Pradesh. For each plant its botanical name, local name, English name and part used are described. Data are based on personal survey, observation and discussion with villagers.

953. **Singh, Archna, Sharma, Yogendra, Kumar, Arvind & Rana, J.C. 2008.** "Important medicinal plants in Moolbari watershed area of Himachal Pradesh". *J. Econ. Taxon. Bot.* 32(Suppl.): 123–130.

Abstract: The Moolbari watershed is located in district Shimla on Shimla-Bilaspur highway about 12 km away from Shimla. It lies between 77°05' to 77°54' E longitude and 31°09' to 31°11' N latitude and at an altitudinal range of 1400-2000 m in Himachal Pradesh. Himalaya with its varied climate, soil and different land forms support a rich medicinal plant heritage, which has been used from time immemorial as herbal remedy for amelioration of people sufferings. In the present communication about 66 species have been recorded which are widely used by the local against various ailments.

954. **Singh, G.S. 1999.** "Ethnobotanical study of useful plants of Kullu district in north western Himalaya, India". *J. Econ. Taxon. Bot.* 23(1):185–198.

Abstract: This paper provides a brief ethnobotanical account of 109 plant species belonging to 41 families and 86 genera found in north western Himalayas. Of the total recorded species, one species belongs to fungi, one to pteridophytes, 6 to gymnosperms and 101 species to angiosperms. Ninety three species were found inside the forest boundary while 16 species were maintained around the settlements and farm fields. Of the total enumerated species, 73 species were found to be used to cure variety of diseases. The preparation, utilization, distribution along with family,

scientific and local name (s) and their role in traditional wisdom for the health care are discussed. Ethnobotanically, the area remains unexplored and no comprehensive account of local traditional knowledge is available. The importance of recording the usage of plants in this region is especially imperative because of rapid loss of forest wealth and traditional wisdom. In view of this fact, an attempt has been made in this paper to record the medicinal and non-medicinal properties of plants used by the people of Chhakinal watershed in Kullu district of north western Himalayas.

955. **Singh, G.S. 2000.** Ethnobotanical study of useful plants of Kullu district in north western Himalaya, India. In: Maheshwari, J.K. (Ed.), *Ethnobotany and Medicinal Plants of Indian Subcontinent*. Scientific Publishers, Jodhpur. Pp. 185–198.

956. **Singh, G.S. 2000.** "Traditional phytotherapy amongst the rural communities of North Western Himalaya". *Bull. Bot. Surv. India* 42(1-4): 121–126.

Abstract: This paper deals with 73 species of medicinal plants used by the traditional communities of Kullu district of north western Himalaya, forest wealth and traditional wisdom. An attempt has been made to record interesting folk-uses and medicinal plant lore used by the people at Chhakinal watershed in Kullu district of north western Himalaya.

957. **Singh, G.S. 2004.** "Prospects of indigenous medicinal plants of Himachal Himalaya". *Indian Forester* 130(1): 62–70.

Abstract: This study centered on indigenous knowledge, marketing channels, conservation practices, impact of market forces and policies of Forest Department pertaining to medicinal plants at Chhakinal watershed in Himachal Himalaya. Earlier, medicinal plants were harvested on subsistence basis. But, in recent decades, factors such as rising market and population demand and change in socio-economic values have altered the extraction pattern at alarming pace resulting over-extraction of herbal plants. Further, some of the medicinal plants are under great pressure and are likely to disappear from the area. The margin of profits to the villagers from medicinal resources could be improved by appropriate changes in the marketing pattern, extraction procedure, improvement in traditional knowledge, empowerment of local communities and altering innovative Government policies and porgrammes. Government owned forestland and other uncultivated lands are the areas where medicinal plants can grow as constituents of natural vegetation.

958. **Singh, G.S. 2004.** "Indigenous knowledge and conservation practices in tribal society of Western Himalaya: A case study of Sangla valley". *Studies Tribes & Tribals* 2(1): 29–35.

Abstract: The tribal people of the Sangla valley of Kinnaur district of Himachal Pradesh constitute a special category of economically backward area due to its inaccessibility and inhospitable geo-climatic set-up of the region. Subsistence agriculture, livestock

rearing and trading off the minor forest products are the only means of economy activities of the marginal people. The tribals have accumulated their own innovative traditional knowledge and have developed a congenial relationship with the locally available biological resources and diverse geo-climatic conditions thus, establishing a perfect harmony with the nature. These people since time immemorial are practicing the indigenous means of conservation of cultural and biological diversity. The existence of an age-old tradition of preserving forests on the ground of religious and mythological beliefs has become a key factor in the revival of degraded areas. A meaningful development could only be achieved when cultural practices (based on indigenous knowledge) are synthesized with the ecological and economic development packages/programmes by involving local people of the region.

959. **Singh, Jagdish, Singh, Joginder & Sharma, Drishti. 2018.** "Traditional wisdom to treat the most common ailments in Chopal region of Shimla district, Himachal Pradesh, India". *Pl. Archives* 18(2): 2759–2769.

Abstract: A total of hundred ethnomedicinal plants belonging to 56 plant families were recorded from the Chopal region of Shimla district which were used to treat the most common ailments viz. minor cuts, wounds, boils, fever, gastric, cough, piles and jaundice etc. The maximum numbers of sixteen plant species were used for treatment of minor cuts and wounds, followed by fifteen numbers of species for boils and pimples. While twelve species each was used for treatment of fever, gastric and constipation. The number of ethnomedicinal plants used for treatment of stomach-ache, bronchitis, piles, jaundice and sprain were 11, 10, 10, 8 and 8, respectively. Among growth forms, maximum were herbaceous plants (51 nos.), followed by shrubs (21 nos.), trees (20 nos.), climbers (6 nos.), fern and fungi (1 no.) each.

960. **Singh, J., Rajasekaran, A. & Sharma, K.D. 2008.** "Traditional ethnobotanical knowledge of Kiran Pargana, Shimla district, Himachal Pradesh". *J. Econ. Taxon. Bot.* 32(Suppl.): 253–263.

Abstract: Ethnobotanical study of Kiran Pargana, a remote part of Shimla district, Himachal Pradesh, revealed 97 plant species belonging to 50 families used for various purposes. The 97 plant species include three gymnosperms, one fungus and 93 angiosperms. Of the 97 species, herbs and trees contributed 33.0% each followed by shrubs (23.7%), climbing shrubs 5.2%, small trees 4.1% and herbaceous climbers 1.0%. Thirty-nine species are edible, 26 medicinal, 11 used as fuel wood, 7 as veterinary medicine, 4 used for making agricultural implements, 3 as timber and 15 are used for miscellaneous purposes.

961. **Singh, J., Rajasekaran, A., Negi, A.K. & Negi, S.P. 2019.** "Utilization of edible wild plants as supplementary source of nutrition by indigenous communities in Kinnaur district, Himachal Pradesh, India". *Indian Forester* 145(6): 561–577.

Abstract: This study documents a total of 168 edible wild plant species belonging to sixty five families and 113 genera, utilized as a source of supplementary nutrition by the indigenous communities of the Kinnaur district, Himachal Pradesh. Of these, 150 species are angiosperms, four gymnosperms, two pteridophytes and twelve fungi. These plants were reported as edible by 279 informants of different age groups of both genders. Rosaceae was recorded as the most dominant family with twenty three edible wild plant species followed by Polygonaceae, Brassicaceae, Asteraceae and others. Herbs shared maximum growth form followed by shrubs, trees and climbers. Fruit parts were used maximum followed by tender leaves, seeds, underground parts, etc. Wild plant species reported as edible by maximum number of informants were listed as most used plants. *Prunus cornuta* was the most used plant followed by *Hippophae salicifolia*, *Fragaria vesca, Elaeagnus parvifolia*, etc. It has been observed that knowledge about the edibility of many wild plants is diminishing among young generations. Therefore, it is suggested that large scale awareness programmes on edible wild plants should be initiated. Paper highlights the need to prioritize important commercially potential species for conservation, domestication and development of valued added economic products.

962. **Singh, J., Rajasekaran, A., Negi, A.K. & Pala, N.A. 2014.** "Wild vegetable plants used by tribal people of Kinnaur district, Himachal Pradesh, India". *Int. J. Usuf. Manage.* 15(2): 47–56.

Abstract: To document the traditional knowledge and usage about wild vegetable plants, a total of 179 people of both genders belonging to different age groups were interviewed in seventeen villages of three blocks of the Kinnaur district, Himachal Pradesh. Thirty one wild vegetable species belonging to 22 genera and 16 families were used by tribal people for vegetable preparation. Among sixteen families, Asteraceae, Malvaceae and Polygonaceae had four wild vegetable species each followed by Brassicaceae with three species. Four plant families had two wild vegetable species each and remaining eight families had one species each. Among the wild vegetable plants recorded, all were herbs except *Ficus palmata*. *Diplazium esculentum, Nasturtium officinale* and *Phytolacca acinosa* were preferred and most used species for making vegetables due to their palatability and taste. The study revealed that the knowledge is vanishing due to changing social values and non participation of younger generation in collection and processing of such wild vegetables plants.

963. **Singh, Kiran. 2015.** "Patterns of indigenous knowledge in reproductive health: A study in Himachal Pradesh". *Int. J. Social Sci. Manage.* 2(2): 139–142.

Abstract: In the Present era various populations of India have belief in every phase of life sickness. Indigenous knowledge cannot be verified by scientific criteria nor science can be adequately assesses tenets of Indigenous knowledge. Both built on different philosophy, methodology and criteria. These two systems tends to serve

contrast exploration of interface. Indigenous knowledge for health concepts articulate physical activity, spiritual emotional element from both individual and communal perspective. Objective: To explore once to indigenous medicine, health local healer. To explore practice used by people during pregnancy discomfort dietary practice source of healing. Area of Study: Himachal Pradesh Village Population Study: Brahmins. It was observed that curing different discomfort during pregnancy women's are using different local plants.

964. **Singh, K.J. & Thakur, A.K. 2014.** "Medicinal plants of the Shimla hills, Himachal Pradesh: A survey". *Int. J. Herbal Med.* 2(2): 118–127.

Abstract: Himachal Pradesh, located in the lap of the Himalayas, has varied climatic conditions due to variations in altitude and topography, which make this state a home for wide variety of plants. The Shimla hills have a rich repository of medicinal and other useful plants. The important biodiversity of medicinal plants of Shimla hills was surveyed between 2011 and 2013 at various places in Shimla and neighbourhood. Some of the important plants recorded were Malabar nut, Indian Horse Chestnut, Bracted Bugleweed, Aloe, Asparagus, Orchid Tree, Barberry, *Bergenia*, Indian Laburnum, Cedar tree, Indian Bay Leaf, Crepe Ginger, *Datura*, Indian Gooseberry, Spiked Ginger Lily, Yellow Jasmine, Walnut, Box Myrtle, Holy Basil, Oregano, Kakkar, Wild Himalayan Cherry, Wild Pomegranate, *Rhododendron*, Indian Madder, Himalayan Yew, Thyme, Himalayan Violet, Chaste Tree and Winged Prickly Ash etc.

965. **Singh, K.K. & Kumar, K. 2000.** *Ethnobotanical wisdom of Gaddi tribe in western Himalaya*. Bishen Singh Mahendra Pal Singh, Dehra Dun.

Abstract: The book is based on the intensive and extensive ethnobotanical survey and field studies among the Gaddi tribe of Western Himalaya. They live in remote forest areas ranging from the foothills to high attitude of Dhauladhar ranges in the district of Kangra, Chamba and other adjacent region of Himachal Pradesh in Western Himalaya. Gaddi is the ancient tribe of Himalaya having about 1 lakh population. Their life style is quite different and interesting from other hill communities of the Himalayas. The book deals with traditional life style and culture of Gaddi's in relation to medicinal and economic plant wealth covered in chapters viz. Introduction, Gaddi's of Western Himalaya, Ethnobotanical Plant-Food, Medicine, Fibre, Oil, gum and Resin, Dyes and Tannin, Fodder, and miscellaneous uses, Ecodevelopment of the region. An exhaustive inventory of about 450 plants and plant products of ethnobotanical value has been death in the book. The biodiversity resources utilized by the tribes in their day to day life and healthcare has been provided in the book. The book contains so many photographs and illustrations pertaining to vegetation, plants and plant product. A number of new or less known ethnomedicinal preparation/reciepes are described based on the indigenous Phytotherapy of Gaddi medicinemen.

966. **Singh, K.K. & Kumar, K. 2000.** "Observations in ethnoveterinary medicine among the Gaddi tribe of Kangra valley, Himachal Pradesh". *Ethnobotany* 12(1-2): 42–44.

Abstract: Kangra valley in Himachal Pradesh is situated in the Himalayan belt. The region is endowed with rich and diverse plant wealth and is inhabited by Gujjars, Gaddi and other hill communities. The Gaddis are migratory shepherds who practise herbal therapy for the treatment of their ailments and animal diseases and disorders. Some of the important ethnoveterinary medicinal plants used for the treatment of sickness of animals are reported.

967. **Singh, K.N. & Lal, B. 2008.** "Ethnomedicines used against four common ailments by the tribals communities of Lahaul-Spiti in Western Himalaya". *J. Ethnopharmacol.* 115(1): 147–159.

Abstract: The present study aimed to highlight the new or lesser known medicinal uses of plant bioresource along with validation of traditional knowledge that is widely used by the tribal communities to cure four common ailments in Lahaul-Spiti region of western Himalaya. The study area inhabited by Lahaulas and Bodhs (also called as Bhotias), is situated in the cold arid zone of the state of Himachal Pradesh (HP), India. During the ethnobotanical explorations (2002–2006), observations on the most common ailments like rheumatism, stomach problem, liver and sexual disorders among the natives of Lahaul-Spiti were recorded. Due to strong belief in traditional system of medicine, people still prefer to use herbal medicines prescribed by local healers. A total 58 plant species belonging to 45 genera and 24 families have been reported from the study area to cure these diseases. Maximum use of plants is reported to cure stomach disorders (29) followed by rheumatism (18), liver problems (15) and sexual ailments (9). Among plant parts used, leaves were found used in maximum herbal preparations (20) following flowers (12) and roots (11) respectively. Most of these formulations were prescribed in powder form, whereas juice and decoction forms were also used. Plants having more than one therapeutic use were represented with 24 species, however 34 species were reported to be used against single specific ailment. Validation of observations revealed 38 lesser known or new herbal preparations from 34 plant species, where 15 species were used to cure stomach disorders, 7 for rheumatism, 10 for liver disorders and 6 for sexual problems. Mode of preparation, administration and dosage are discussed along with the family and local names of plants and plant parts used.

968. **Singh, K.N., Lal, B. & Todaria, N.P. 2012.** "Ethnobotany of higher plants in Spiti Cold Desert of Western Himalaya". *Nature & Sci.* 10(5): 7–14.

Abstract: The present article deals with the plants used in traditional phytotherapy amongst indigenous people of Bhotia community of Indian western Himalaya. Ethnobotanical surveys were conducted during 2002–2009 in Spiti valley to collect

information on traditional use of plant species as medicine from different localities. A total of 50 plant species belonging to 25 families have been reported to be used for treating different ailments ranging from cough and cold to jaundice. Among the plant parts used as a remedy, leaves (31%) were recorded to be used to a large extent followed by flowers (17%), and whole plant (16%), respectively. The species reported are enumerated in tabular form with their family in alphabetical order followed by scientific name of plant and collection number. Local name of plant, part(s) used, locality, name of ailments treated, mode of preparation and prescription of medicine are given. Total 29 claims of herbal preparations utilized in traditional medicines have been identified as hitherto unknown or lesser known and are marked with asterisk (*). Information from selective relevant literature, are also provided for a comparative account on medicinal uses across communities and traditional systems of medicine in India.

969. **Singh, N.B. 1990.** "Medicinal wealth of Kinnaur". *Van Vigyan* 28(4): 174–181.

970. **Singh, P.B. 1993.** "Medicinal plants of ayurvedic importance from Mandi district of Himachal Pradesh". *Bull. Med.-Ethno-Bot. Res.* 14:126–136.

971. **Singh, P.B. 1996.** Wild edible plants of Mandi district in Northwest Himalaya. In: Jain, S.K. (Ed.). *Ethnobiology in Human Welfare*. Deep Publ., New Delhi, Pp. 22–25.

972. **Singh, P.B. 1999.** *Illustrated field guide to commercially important medicinal and aromatic plants of Himachal Pradesh (with special reference to Mandi district)*. Society for Herbal Medicine and Himalayan Biodiversity, Mandi, Himachal Pradesh.

973. **Singh, P.B. & Aswal, B.S. 1992.** "Medicinal plants of Himachal Pradesh used in Indian pharmaceutical industry". *Bull. Med.-Ethno-Bot. Res.* 13:172–208.

974. **Singh, Shalini, Kharkwal, K., Kant, Rajni, Sinha, B.K. & Ambrish, K. 2017.** "Studies on ethnobotanical aspects of pteridophytes in Great Himalayan National Park, Kullu, Himachal Pradesh". *Phytotaxonomy* 17: 43–49.

Abstract: India has a rich diversity of medicinal plants. The supply base of 90% herbal raw drugs used in the manufacture of Ayurveda, Siddha, Unani and Homeopathy systems of medicine is largely dependent on the wild. Realizing the importance of the economic utility of plant resources, a number of workers has explored the advantages of plant diversity of Himalayan region. The present study deals with the assessment of ethnobotanically important ferns of Great Himalayan National Park (GHNP). Out of 3200 species of angiosperms (Chowdhery and Wadhwa, 1984), 1200 species are reported to be of medicinal importance (Chopra *et al.* 1956, 1969), but still the ethnobotanical knowledge in regard to the Pteridophytes in the study area is lacking. Hence, in the present communication, an attempt was made to document the ethnobotanical values of certain species of pteridophytes collected from the Park area. A list of 18 ferns under 13 genera belonging to 10 families has been prepared.

Out of them, 18 ferns were found to be ethnobotanically important. Some highly used ferns are *Adiantum capillus-veneris* L., *Diplazium esculentum* (Retz.) Sw., *D. maximum* (D. Don) C. Chr., *Dryopteris juxtaposita* Christ and *Pteris vittata* L.

975. **Singh, S.K. 1999.** "Ethnobotanical study of useful plants of Kullu district in northwestern Himalayas, India". *J. Econ. Taxon. Bot.* 23(1): 185–198.

Abstract: This paper provides a brief ethnobotanical account of 109 plant species belonging to 41 families and 86 genera found in north western Himalayas. Of the total recorded species, one species belong to fungi, one to pteridophytes, 6 to gymnosperms and 101 species to angiosperms. Ninety three species were found inside the forest boundary while 16 species were maintained around the settlements and farm yields. Of the total enumerated species, 73 species were found to be used to cure variety of diseases. The preparation, utilization, distribution along with family, scientific and local name (s) and their role in traditional wisdom for the health care are discussed. Ethnobotanically, the area remains unexplored and no comprehensive account of local traditional knowledge is available. The importance of recording the usage of plants in this region is especially imperative because of rapid loss of forest wealth and traditional wisdom. In view of this fact, an attempt has been made in this paper to record the medicinal and non-medicinal properties of plants used by the people of Chhakinal watershed in Kullu district of north western Himalayas.

976. **Singh, S.K. 2004.** "Ethno-medicinal plants of Kullu valley, Himachal Pradesh". *J. Non-Timber Forest Prod.* 11(1): 74–79.

Abstract: In the present paper 80 species of angiosperms and 1 species each of fungi and lichen which have ethno-medicinal value are given along with local name, family, parts used and uses.

977. **Singh, S.K. & Uniyal, V.P. 2008.** "Some important west Himalayan high altitude medicinal plants". *J. Econ. Taxon. Bot.* 32(Suppl.): 216–222.

Abstract: The present article presents a brief account of some medicinal plants if Western Himalaya. Uncontrolled exploitation, other biotic factors and physical factors have endangered many of these very important species. These plants immediately need protection since they are heavily exploited for commercial use and are under severe threat for their existence. The medicinal ises of some important species are provided in this communication.

978. **Singh, V. & Chauhan, N.S. 2005.** "Traditional practices of herbal medicines in the Lahaul valleys, Himachal Himalayas". *Indian J. Tradit. Knowl.* 4(2): 208–220.

Abstract: Observations on the traditional practices of herbal medicines were recorded in the villages of Lahaul, a semi-arid region of district Lahaul-Spiti, a dry temperate region of Himachal Himalayas. The information was recorded for the habitat,

plant characteristics, plant part used of 43 plant species, belonging to 25 families and diseases treated in the Lahaul valley.

979. **Sood, S.K. & Thakur, S. 2004.** *Ethnobotany of Rewalser Himalaya*. Deep Publication, New Delhi.

980. **Sood, S.K., Nath, R. & Kalia, D.C. 2001.** *Ethnobotany of Cold Desert tribes of Lahoul-Spiti (N.W. Himalaya)*. Deep Publications, New Delhi.

981. **Srivastava, S.K. & Chandrasekar, K. 2004.** "Ethnomedicine of the Pin Valley National Park, Himachal Pradesh: Plants used in treating dysentery". *Ethnobotany* 16: 62–63.

Abstract: The paper describes ethnomedicinal applications of 10 plant species by the tribals of Pin Valley National Park, Himachal Pradesh in treating dysentery. It forms the first ethnobotanical report on their use in curing this ailment. Information on botanical name, family, local name, locality, mode of application and dosage are given.

982. **Srivastava, S.K., Chowdhery, H.J. & Rawat, G.S. 1987.** Some economically important plants from Beas-Sutlej link project area in Himachal Pradesh. In: Sharma, M.R. & Gupta, B.K. (Eds.), *Recent Advances in Plant Sciences* (Proceedings of the Symposium on Recent Advances in Plant Sciences held at D.A.V. College, Dehra Dun from October 7 to 9, 1985). Bishen Singh Mahendra Pal Singh, Dehra Dun. Pp. 131–146.

983. **Srivastava, T.N., Kapahi, B.K. & Sarin, Y.K. 1992.** "Ethnobotanical studies in Lahul and Spiti, Himachal Pradesh". *Ancient Sci. Life* 11: 126–130.

Abstract: The paper presents 41 folklore claims collected from the tribes Gaddi, Swangla, Bhot and other local inhabitants residing in the district of Lahul and spiti in Himachal Pradesh. 41 taxa belonging to 39 genera and 24 families have been described. Botanical name of the plant, family, local name, place of collection, altitude, collection number and mode of administration have been given. Uses of most of the herbs are reported here for the first time.

984. **Thakur, K. & Puri, S. 2016.** "Ethnobotanical plants of Bandli Wildlife Sanctuary, Mandi, Himachal Pradesh". *Int. J. Advanced Res.* 4(6): 106–108.

Abstract: Bandli Wildlife Sanctuary is located in Mandi district of Himachal Pradesh. This Protected area is rich in plant diversity due vast altitudinal variation (600 – 2160 m) and geographical conditions. Present study was planned to collect information of plants used by inhabitants of this Wildlife Sanctuary. Field surveys were conducted during July 2012 to June 2014 on monthly basis to collect data on ethnobotanically important plants from villagers and traditional healers. A total of 104 plants species including 36 species of trees, 27 of shrubs, two of climbers and 39 species of herbs were documented. The plants were regularly used as fodder and forage, medicinal and religious purposes. Traditions, customs and cultural rights play a key role in protection of biodiversity and environment. Hence, there is a need to utilize the ethnobotanical

information and promote the indigenous people as they contribute hugely in conserving the biodiversity.

985. **Thakur, K.S., Kumar, M. & Pala, N.A. 2016.** "Utilization of valuable higher altitude plants as a source of income generation and traditional medicine in Bharmour Forest Division, Himachal Pradesh, India". *Med. Aromat. Pl. 5*: 226 (3 pages). (doi: 10.4172/ 2167-0412.1000226).

Abstract: The present study was conducted in Holi and Bharmour areas of Bharmour Forest Division of Himachal district in Himachal Pradesh state of India. Seven (07) valuable and conservation demanding traditionally used medicinal plant species were covered under the study. The information includes traditional knowledge of the plants used by the local people of the area. The species reported are highly exploited for various purposes as different parts like root, leaves and even whole plant is harvested for reasons. The informants from the study area blame the excessive extraction for reducing population of these species. Therefore, suggested *ex situ* and *in situ* conservation measures can be helpful for conservation of the species for sustainable utilization.

986. **Thakur, K.S., Kumar, M., Bawa, R. & Bussmann, R.W. 2014.** "Ethnobotanical study of herbaceous flora along an altitudinal gradient in Bharmour Forest Division, district Chamba of Himachal Pradesh, India". *Evidence-Based Complementary and Alternative Medicine* 2014, Article ID 946870, 7 pages.

Abstract: The present ethnobotanical study was carried out in Holi (Deol, Kut, Dal, and Lahaud Dhar) forest range and in Bharmor (Seri, Bharmour, Malkauta, Bharmani, Harsar, Dhancho, Sundrasi, Gorikund, and Manimahesh) forest range to obtain information on the plants used by the local inhabitants for several purposes. A total of 54 plants were recorded in this study. The plants are employed to treat simple diseases (cough, cold, fever, and burns) and some serious diseases (typhoid, jaundice, and kidney disease). Some of the plants are also used as incense for religious ceremonies and several other daily needs. But due to absence of scientific monitoring of plants, their cultivation, harvesting, and management techniques as well as sustainable use and lack of awareness of social factors, the availability of valuable plant resources is decreasing at an alarming rate. In addition, the indigenous knowledge regarding the use of lesser-known plants of this region is also rapidly declining. Therefore, the documentation of plant resources is a necessary step towards the goal of raising awareness in local communities about the importance of these plants and their further conservation.

987. **Thakur, M., Asrani, R.K., Thakur, S., Sharma, P.K., Patil, R.D., Lal, B. & Prakash, O. 2016.** "Observation on traditional uses of ethnomedicinal plants in humans and animals of Kangra and Chamba districts of Himachal Pradesh in North-Western Himalaya, India". *J. Ethnopharmacol*. 191: 280–300.

Abstract: Medicinal plants are frequently used by Gaddi and Gujjar tribes of Kangra and Chamba districts of Himachal Pradesh, India to cure various ailments in humans and livestock. Therefore, extensive field work was conducted to document the traditional use of ethnomedicinal plants by these tribes. A total of 73 plant species in 67 genera and 40 families were observed to be medicinal and used to cure 22 ailment categories.

988. **Thakur, N., Savitri & Bhalla, T.C. 2004.** "Characterization of some traditional fermented foods and beverages of Himachal Pradesh". *Indian J. Tradit. Knowl.* 3(3): 325–335.

Abstract: Traditional fermented foods and beverages are very popular in the tribal and rural areas of Himachal Pradesh. A number of fermented foods and beverages were identified and the traditional fermentation processes were studied. Some of the popular fermented foods and beverages were analysed for their microbiological characteristics. The fermented products that are unique to the tribal and rural belts of Himachal are *Bhaturu*, *Siddu, Chilra, Manna, Marchu, Bagpinni, Seera, Dosha, Sepubari, Sura, Chhang, Lugri, Daru, Angoori* and *Behmi*. Besides source of nutrition, these fermented foods e.g. *Bhaturu*, constitute staple food in larger part of rural areas of Kullu, Kangra, Mandi and Lahaul & Spiti districts of the state while others are consumed during local festivals, marriages and special occasions. Traditional starter cultures like '*Phab*' (dehydrated yeast formulations), '*Treh*' (previously fermented wheat flour slurry) and '*Malera*' (previously fermented wheat flour dough) are the inocula used in preparing fermented products. Microbiological studies revealed that species of *Saccharomyces cerevisiae* is a dominant microorganism in fermentation along with species of *Candida, Leuconostoc* and *Lactobacillus*. The ethanol content of some of the fermented beverages was also analysed.

989. **Thakur, N., Kumar, D.S., Savitri & Bhalla, T.C. 2003.** "Traditional fermented foods and beverages of Himachal Pradesh". *Invention Intelligence* 38: 173–178.

990. **Thakur, P. & Sarika. 2016.** "Ethno-medicinal uses of some plants of Potter's Hill in Shimla (Himachal Pradesh, India)". *Biol. Forum- An Int. J.* 8(2): 417–422.

Abstract: The present study was undertaken to provide information about the medicinally important floral diversity of Potter's Hill in district Shimla, Himachal Pradesh. Ethno-medicinal data on 25 plant species belonging to 20 families were reported after undertaking survey. It was found that dominated medicinal plants of this region are main source of primary health care. These plants are used in the forms of decoction, juice, powder, paste and whole plant extract. The popular use of herbal remedies among the rural people of Himachal Pradesh reflects the restoration of interest in the traditional medicine.

991. **Thakur, S. 2001.** *Study on the Ethnobotany of Rewalsar (Mandi District, Himachal Pradesh, India)*. Ph. D. Thesis. H.P. Univ., Shimla. (Unpublished).

992. **Thakur, S. 2011.** "Medicinal plants used by tribal inhabitants of Sirmour district, Himachal Pradesh". *Indian J. Scientific Res.* 2(4): 125–127.

Abstract: The paper documents ethonomedicinal uses of 32 wild plant species from Sirmour district (H.P.). The plant parts most commonly used in the treatment of various diseases are root, leaves, whole plant and bark. The reliance on folk medicine for healthcare is associated with the traditional belief of effectiveness.

993. **Thakur, Shalu Devi & Rajasekaran, A. 2012.** "Commercially important medicinal and aromatic plant of Kullu valley, Himachal Pradesh". *J. Econ. Taxon. Bot.* 36(4): 752–764.

Abstract: This paper provides a commercial account of 66 plant species belonging to 33 families and 53 genera found in the Kullu valley. Of the total recorded species 3 belongs to gymnosperms and 30 to angiosperms. Due to relentless exploitation many medicinal herbs are lost even before they are validated for their potential use as drugs. These species needs to be further investigated for standardization of active compounds. This paper aims at providing multidisciplinary compendium information on medicinal wealth of Kullu valley so that their sufficient conservation, sustainable and commercial utilization can be achieved.

994. **Thakur, Shalu Devi, Hanief, S.M. & Chauhan, N.S. 2009.** "Plants in ethno-veterinary practices in Kullu district-Himachal Pradesh". *J. Econ. Taxon. Bot.* 33(Suppl.): 34–38.

Abstract: This communication carries valuable ethno-veterinary information of 24 plant species along with the botanical name, vernacular name, family, season of flowering/fruiting and part (s) used, modern veterinary pharmaceutical industry requirements of such plants as animal care in gaining importance day by day, but the claims made by the people need to be cross checked by carrying out detailed pharmacological studies before these plants are actually put up for use in the industry.

995. **Thakur, Shalu Devi, Hanief, S.M. & Chauhan, N.S. 2009.** "Ethno-medico studies of some herbs from Kullu valley, Himachal Pradesh". *J. Non-Timber Forest Prod.* 16(1): 77–84.

Abstract: The result of the ethno-medico-botanical survey conducted in Kullu valley of Himachal Pradesh and medicinal uses of 84 plants have been presented in this paper.

996. **Thakur, Shalu Devi, Hanief, S.M. & Chauhan, N.S. 2010.** "Plants in ethno-veterinary practice in Kullu district- Himachal Pradesh". *J. Non-Timber Forest Prod.* 17(1): 55–58.

Abstract: This communication carries valuable ethno-veterinary information of 24 plant species along with the botanical name, vernacular name, family, season of

flowering and fruiting and part (s) used. Modern veterinary pharmaceutical industry requires such plants as animal care is gaining importance day by day but the claims made by the people need to be cross checked by carrying out detailed pharmacological studies before these plants are actually put up for use in the industry.

997. **Thakur, Shalu Devi, Kapoor, K.S. & Samant, S.S. 2011.** "Diversity and indigenous uses of sacred plants in Tirthan Wildlife Sanctuary, Himachal Pradesh". *J. Non-Timber Forest Prod.* 18(2): 123–128.

Abstract: All the nations in this universe have their own set of ecological, socio-economic and religious ethos and accordingly each of them have got every reason to celebrate each related occasion in their own way both at the national and even at regional level. It is beyond any doubt that celebrations of all such occasions are in one way or the other is related to the plants or trees of national and regional significance. Similarly, Himachal Pradesh a small and hilly state is famous for its religious culture and traditions. People of this state are highly religious and varieties of rituals are performed in various ways, round the year by the local people in which plants have their defined roles and importance. Accordingly an attempt through a preliminary survey was made to document the role of sacred plants in the life style of local people and the relations to them with special reference to their religious activities and ethos. In the process it was observed that 45 plant species have high utility and importance in religious activities. The study also reflects that the local beliefs not only show the time immemorial relationship between plants and humans but also help in conserving these species. This article attempts to highlight the importance of some plants known to be traditionally worshipped in the study area. Significance of these plants in different ceremonies and their role in festivals has also been discussed.

998. **Thakur, Suveena & Bhardwaj, S. 2017.** "Studies on traditional uses of plant resources of Kanawar Wildlife Sanctuary, Kullu, Himachal Pradesh". *Indian Forester* 143(3): 232–238.

Abstract: Kanawar Wildlife Sanctuary, one of the 33 sanctuaries of Himachal Pradesh, is situated in Parvati valley of Kullu district. It forms an important conservation unit in the vicinity of Great Himalayan National Park, Kullu and is a part of Great Himalayan National Park Conservation landscape. There are four villages inside Kanawar sanctuary. Besides local community Gaddis, a nomadic tribe of Himachal Pradesh, are also using various resources of the sanctuary for ages. The sanctuary harbours a wide range of plant diversity. It was found during the study that out of total 64 ethno-botanical plants found in the sanctuary 31 are used for curing various diseases of human beings, 6 are used for curing various ailments of animals, 2 are used as dyes and 8 are associated with socio-religious beliefs. Apart from these 16 plants are edible, 4 plants are used as fibres and 7 species are used for miscellaneous purposes.

The uses in detail are described in detail with their botanical name, family, local name, part used, ailment and ethno-botanical use.

999. **Uniyal, Bhagwati. 2003.** "Utilization of medicinal plants by the rural women of Kullu, Himachal Pradesh". *Indian J. Tradit. Knowl.* 2(4): 366–370.

Abstract: The present paper deals with the indigenous knowledge of women in utilization of medicinal plants for curing various diseases. 42 women (in the age group of 15 to 60 years) from three villages of Tirthan valley were interviewed using participatory methods and questionnaire surveys. The results revealed that a total of 25 plants species were utilized for various medicinal purposes.

1000. **Uniyal, M.R. & Chauhan, N.S. 1971.** "Medicinal plants of Uhal Valley on Kangra Forest Division, H.P.". *J. Res. Indian Med.* 6(3): 287–299.

1001. **Uniyal, M.R. & Chauhan, N.S. 1972.** "Commercially important medicinal plants of Kullu Forest Division, HP". *Nagarjun* 4(2): 20–32.

1002. **Uniyal, M.R. & Chauhan, N.S. 1973.** "Traditionally important medicinal plants of Kullu Forest Division". *J. Res. Indian Med.* 7(1): 76–85.

1003. **Uniyal, M.R. & Chauhan, N.S. 1973.** "Traditionally important medicinal plants of Kangra Valley in Dharamsala Forest Circle, Himachal Pradesh". *J. Res. Indian Med.* 8(1): 76–85.

1004. **Uniyal, M.R. & Chauhan, N.S. 1979.** "A preliminary study of the indigenous drugs used at the Tibetean medicinal centre, Dharamsala (HP)". *Nagurjun* 22(8): 190–193.

1005. **Uniyal, M.R., Bhat, H.V. & Chaturvedi, P.N. 1982.** "Preliminary observation on medicinal plants of Lahul and Spiti forest division in Himachal Pradesh". *Bull. Med.-Ethno-Bot. Res.* 3(1): 1–26.

1006. **Uniyal, S.K., Sharma, V. & Jamwal, P. 2011.** "Folk medicinal practices in Kangra district of Himachal Pradesh, Western Himalaya". *J. Hum. Ecol.* 39: 479–488.

Abstract: In India, utilization of plants for medicinal purposes has been documented in ancient texts and more than 40% of the Indian flora is reported to be used for medicinal purposes. In the interior of the country such as the Himalayan region, dependence on plants for healthcare is much higher. The present study was conducted in Kangra district of Himachal Pradesh where dependency on medicinal plants is high, yet detailed information on the plants used for the treating different diseases by the local people and the techniques of treatment is lacking. The *vaids* of this district used 66 plant species comprising of 25 herbs, 23 trees, 10 climbers and 8 shrubs for treating 33 diseases that includes weight management, health food and hair care.

1007. **Uniyal, S.K., Kumar, A., Lal, B. & Singh, R.D. 2006.** "Quantitative assessment and traditional uses of high value medicinal plants in Chhota Bhangal area of Himachal Pradesh, Western Himalaya". *Curr. Sci.* 91(9): 1238–1242.

Abstract: Information on eight highly traded and locally used medicinal plants was collected from the alpine zones of Chhota Bhangal. The study aimed to quantify the current status of these plants in terms of density, frequency and biomass, and also document the indigenous use of these plants for traditional healthcare. Quadrats of 1 x 1 m were used for quantitative assessment of the plants. Informal interviews and discussions were held with local people for recording local uses of the plants. Based on the sampling, it was found that different species had different habitat requirements. Steep slopes of Chhota Bhangal had the highest species richness and diversity, while rocky areas had the least. Maximum similarity in terms of species distribution was observed between steep slopes and undulating meadows. It was found that these medicinal plants are regularly used by the local people for curing various ailments such as stomach ache, fever and kidney stones. However, illegal extraction of plants for commercial purposes seems to have affected their population in nature. However, in comparison to few other alpine areas of western Himalaya, the present study area supports higher population of medicinal plants.

1008. **Uniyal, S.K., Singh, K.N., Jamwal, P. & Lal, B. 2006.** "Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya". *J. Ethnobiol. & Ethnomed.* 2: 1–8.

Abstract: The importance of medicinal plants in traditional healthcare practices, providing clues to new areas of research and in biodiversity conservation is now well recognized. However, information on the uses for plants for medicine is lacking from many interior areas of Himalaya. Keeping this in view the present study was initiated in a tribal dominated hinterland of western Himalaya. The study aimed to look into the diversity of plant resources that are used by local people for curing various ailments. Questionnaire surveys, participatory observations and field visits were planned to illicit information on the uses of various plants. It was found that 35 plant species are commonly used by local people for curing various diseases. In most of the cases (45%) underground part of the plant was used. New medicinal uses of *Ranunculus hirtellus* and *Anemone rupicola* are reported from this area. Similarly, preparation of "*sik*" a traditional recipe served as a nutritious diet to pregnant women is also not documented elsewhere. Implication of developmental activities and changing socio-economic conditions on the traditional knowledge are also discussed.

1009. **Ved, D.K., Kinhal, G.K., Ravikumar, K., Prabhakaran, V., Ghate, U., Sankar, R.V. & Indresha, J.H. (Eds.). 2003.** Report of the Conservation and Assessment Management Prioritization for the Medicinal Plants of Jammu and Kashmir, Himachal Pradesh and Uttaranchal. FRLHT, Bangalore.

1010. **Verma, J., Thakur, K. & Kusum. 2012.** "Ethnobotanically important plants of Mandi and Solan districts of Himachal Pradesh, northwest Himalaya". *Pl. Archives* 12(1): 185–190.

Abstract: Information is provided on traditional knowledge of plants that are used by inhabitants of Mandi and Solan districts of Himachal Pradesh as household remedies for alleviating diseases that are suffered by the local people and their livestock. People from 2 tribes (Gaddis and Gujjars) as well as village vaidyas were the main source of present information and 35 plant species (7 trees, 13 shrubs, 11 herbs and 4 climbers) belonging to 26 families were found to be used in the local medicinal preparations. Of the various plant parts used, leaves were the most commonly employed source of these herbal remedies (18 species); however, crushed whole plants constitute integral part of such preparations in case of 4 species (*Cuscuta reflexa, Sida rhombifolia, Urtica dioica, Verbascum thapsus*). Field surveys revealed that some plant species (*Aloe vera, Centella asiatica, Dioscorea deltoidea, Tinospora cordifolia, Viola serpens*) were unscrupulously exploited by locals that might be incompatible with natural increment of their wild population.

1011. **Verma, R., Parkash, V. & Kumar, D. 2012.** "Ethnomedicinal uses of some plants of Kanag Hill in Shimla, Himachal Pradesh, India". *Int. J. Res. Ayurveda & Pharma*. 3(2): 319–322.

Abstract: In this study an ethno-medicinal survey of plant diversity was carried out at Kanag Hill, Tehsil Theog, district Shimla in Himachal Pradesh. The study was mainly focused on the medicinal plants used for treatment of various ailments by the nearby village inhabitants. The information was collected by questionnaire and consulting local old people. The study was entirely focused on revealing the medicinal potential possessed by the plants growing wild in this area and their sustainability for the betterment of mankind.

1012. **Verma, R.K., Jishtu, V. & Kapoor, K.S. 2005.** "Medicinal plant wealth in alpine area of Talra Wild Life sanctuary, Himachal Pradesh". *J. Econ. Taxon. Bot*. 29(3): 483–490.

Abstract: The alpine area of Talra wild life sanctuary of district Shimla, Himachal Pradesh represents one of the most important reservoirs of medicinal plant resources in Himalayas and is seriously threatened due to various anthropogenic factors. The present paper deals with 37 important medicinal plant species and provides information on their botanical names, plant families, description, flowering and fruiting period and medicinal uses.

1013. **Verma, S. & Chauhan, N.S. 2006.** "Studies on ethno-medico-botany of Kunihar Forest Division, district Solan (H.P.)". *Ethnobotany* 18: 160–165.

Abstract: Kunihar Forest Division, under the administrative jurisdiction of Solan district, boasts of rich plant diversity. The present study was undertaken to make a preliminary survey of plant wealth of this region. The study has revealed 256 species of ethno-botanical importance belonging to 213 genera and 80 families. Important medicinal

and aromatic plants with their nomenclature, family, vernacular names and ethno-botanical uses have been presented in this communication.

1014. **Verma, S. & Chauhan, N.S. 2007.** "Indigenous medicinal plants knowledge of Kunihar forest division, district Solan". *Indian J. Tradit. Knowl.* 6(3): 494–497.

Abstract: Kunihar forest division falling under district Solan boasts of rich plant diversity. The study was undertaken for making preliminary survey of the indigenous technological knowledge on the uses of medicinal plants of Kunihar forest division, district Solan, Himachal Pradesh. Important medicinal and aromatic plants with their vernacular names, family and indigenous uses have been presented.

1015. **Verma, S. & Chauhan, N.S. 2008.** "Ethnobotany of some healing plants of Kunihar Forest Division, district Solan (Himachal Pradesh), India". *J. Econ. Taxon. Bot.* 32(Suppl.): 315–326.

Abstract: Our knowledge of the intimate relationship between early man and plants has come to us mainly through surviving traditions. This relationship which forms the core of inter-disciplinary science, known as ethnobotany, has attracted much attention. Kunihar forest division falling under the administrative jurisdiction of district Solan boasts of rich plant diversity. The present course of study was undertaken for making preliminary survey of plant wealth of Kunihar forest division, district Solan of Himachal Pradesh. An analysis of data in the present communication reveals the uses of 98 species belonging to 47 families for health care among the people of the area.

1016. **Vidyarthi, Shalini, Samant, S.S. & Sharma, Pankaj. 2013.** "Traditional and indigenous uses of medicinal plants by local residents in Himachal Pradesh, north Western Himalaya, India". *Int. J. Biodiv. Sci. Ecosyst. Serv. & Manage.* 9(3): 185–200.

Abstract: In the hilly areas of Indian Himalaya, the inhabitants largely depend on plants for curing various diseases. The indigenous knowledge and traditional practices of medicinal plants are vanishing fast. Therefore, we aimed to document indigenous uses of some important medicinal plants of Kullu district; analyze distribution pattern, nativity and endemism of these medicinal plants; and suggest conservation strategies. We recorded information on 75 species of medicinal plants. The recorded species represent trees (12 spp.), shrubs (15), herbs (47), and fungi (1). Of these, 29 medicinal plants were native,1 endemic, 11 near-endemic, and 46 non-native. Of all species, various plant parts such as leaves (32 spp.), roots (29), tubers (2), seeds (8), fruits (10), ûowers (8), fruiting body (1), bark (8), stem (3), and wood (2) were used in curing various diseases. We recommend further studies on habitat ecology of the species, mass multiplication of commercially viable species through conventional and *in vitro* methods, and their establishment in the *in situ* and *ex situ* conditions. Furthermore, it is

important to develop farming techniques of commercially viable species and disseminate knowledge among stakeholders through education and awareness rising.

1017. **Vidyarthi, Shalini, Samant, S.S. & Sharma, Pankaj. 2014.** "Diversity, distribution and indigenous use of medicinal plants of Nirmand block in Seraj valley, Kullu district of Himachal Pradesh". *J. Non-Timber Forest Prod.* 21(3): 145–152.

Abstract: The Indian Himalayan region is one of the richest reservoirs of biological diversity in the world and is considered as a store-house of the valuable medicinal plants. In the remote areas of Indian Himalaya, the inhabitants are largely dependent on plants for curing various diseases/ailments. But, due to urbanisation and modernization, the indigenous knowledge and traditional practices of medicinal plants are vanishing fast. The Kullu district of Himachal Pradesh is one of he twelve districts, and is a veritable emporium of herbal plants and consists of five blocks (Kullu, Anni, Banjar, Naggar and Nirmand). Nirmand block (31°25'28" N and 77°34'36" E) covers an area of 77.45 km^2. The medicinal plants wealth of Nirmand valley has not been explored so far. Therefore, an attempt has been made to (i) assess the medicinal plants diversity; (ii) document indigenous uses and practices; (iii) analyse for nativity and endemism and (iv) suggest strategy for conservation and management of the species. The present study recorded the first hand information on 41 species of medicinal plants belonging to 39 genera and 29 families from the Nirmand block. The recorded species represents trees (6 spp.), shrubs (6 spp.) and herbs (29 spp.). Different parts of these species, such as whole plants, roots, leaves, flowers, fruits, seeds, stems, barks, etc. were used by the inhabitants for curing various diseases. Twenty seven species were natives and 14 species non-natives to the Himalayan region. Due to changing environmental conditions and habitat degradation, the populations of many species are depleting fast. Therefore, studies on habitat ecology, development of conventional and *in-vitro* propagation protocols and introduction in cultivation and natural habitats are suggested.

ABBREVIATION OF JOURNALS

The titles of journals have been standarised following Botanico-Periodicum-Huntianum (Lawrence & al., 1968), B-P-H/Supplementum (Bridson & Smith, 1991) and BPH2: Periodicals with Botanical Content (Bridson, 2004). The journals which are not in BPH and its Supplements have been abbreviated as suggested in the journals, or as per the rules of B-P-H.

Acta Mycol.	:	Acta Mycologica
Advances Pl. Sci.	:	Advances in Plant Sciences
Ancient Sci. Life	:	Ancient Science Life
Ann. Arid Zone	:	Annals of Arid Zone
Ann. Forest.	:	Annals of Forestry
Ann. Pl. Sci.	:	Annals of Plant Science
Acta Bot.	:	Acta Botanica
Ambio	:	Ambio
American Fern J.	:	American Fern Journal
Ann. Forest.	:	Annals of Forestry
Ann. Pl. Sci.	:	Annals of Plant Science
Appl. Bot. Abstr.	:	Applied Botanical Abstract
Appl. Ecol. & Environm. Sci.	:	Applied Ecological & Environmental Science
Archives Bryol.	:	Archives Bryology
Arch. Phytopathol. Pl. Prot.	:	Archives of Phytopathology and Plant Protection
Asian Agri. Hist.	:	Asian Agricultural History
Asian J. Adv. Basic Sci.	:	Asian Journal of Advanced Basic Sciences
Asian J. Exp. Biol. Sci.	:	Asian Journal of Experimental Biological Sciences
Biblioth. Mycologica	:	Bibliotheca Mycologica
Biblioth. Pteridologica	:	Bibliotheca Pteridologica
Bio Bull.	:	Bio Bulletin
Biodiv. & Conserv.	:	Biodiversity and Conservation
Biol. Conserv.	:	Biological Conservation
Biol. Forum- An Int. J.	:	Biological Forum- An International Journal
Biol. Mem.	:	Biological Memoirs
Biomass & Bioenergy	:	Biomass & Bioenergy
Bionotes	:	Bionotes
Biosci. Biotech. Res. Asia	:	Biosciences, Biotechnology Research Asia
Bot. J. Linn. Soc.	:	Botanical Journal of the Linnean Society
Bull. Bot. Surv. India	:	Bulletin of the Botanical Survey of India (Vol. 1–50, 1959–2009. Superseded by: Nelumbo)
Bull. Med.-Ethno-Bot. Res.	:	Bulletin of Medico-Ethno-Botanical Research
Caryologia	:	Caryologia

Check List	:	Check List
Chinese Med.	:	Chinese Medicine
CPHU Res. J.	:	CPHU Research Journal
Curr. Res. Environm. & Appl. Mycol.	:	Current Research in Environmental & Applied Mycology
Curr. Res. Pl. Sci.	:	Current Research in Plant Science
Curr. Sci.	:	Current Science
Econ. Bot.	:	Economic Botany
Ecoprint	:	Ecoprint
Environm. Biol. & Conserv.	:	Environment Biology and Conservation
Environm. & Ecol.	:	Environment & Ecology
Environm. Monit. Assessm.	:	Environment Monitoring Assessment
Environm. & We	:	Environment & We
ENVIS Newsletter: Himal. Ecol.	:	ENVIS Newsletter Himalayan Ecology
Ethnobotany	:	Ethnobotany
Ethnobotany Res. & Appl.	:	Ethnobotany Research and Applications
Ethnobot. Leafl.	:	Ethnobotanical Leaflet
Evidence-Based Complementary and Alternative Medicine	:	Evidence-Based Complementary and Alternative Medicine
Feddes Repert.	:	Feddes Repertorium
Forestry Ideas	:	Forestry Ideas
Frontiers Biol. & Life Sci.	:	Frontiers in Biology & Life Science
Geobios, New Rep.	:	Geobios, New Reports
Geophytology	:	Geophytology
Global J. Res. Med. Pl. & Indigenous Med.	:	Global Journal of Research on Medicinal plants and indigenous medicine
Himachal Hort.	:	Himachal Horticulture
Indian Bee J.	:	Indian Bee Journal
Indian Fern J.	:	The Indian Fern Journal
Indian Forester	:	The Indian Forester
Indian J. Ecol.	:	Indian Journal of Ecology
Indian J. Forest.	:	Indian Journal of Forestry
Indian J. Forest., Addit. Ser.	:	Indian Journal of Forestry, Additional Series
Indian J. Fundamental & Appl. Life Sci.	:	Indian Journal of Fundamental and Applied Life Sciences
Indian J. Mount. Sci.	:	Indian Journal of Mountain Science
Indian J. Nat. Prod. & Resources	:	Indian Journal of Natural Products & Resources
Indian J. Pl. Genet. Resour.	:	The Indian Journal of Plant Genetic Resources
Indian J. Pl. Sci.	:	Indian Journal of Plant Sciences
Indian J. Appl. & Pure Biol.	:	Indian Journal of Applied & Pure Biology
Indian J. Scientific Res.	:	Indian Journal of Scientific Research

Int J. Sci. & Res. Publ.	:	International Journal of Scientific and Research Publications
Indian J. Tradit. Knowl.	:	Indian Journal of Traditional Knowledge
Indian J. Trop. Biodiv.	:	Indian Journal of Tropical Biodiversity
Indian Perfumer	:	Indian Perfumer
Int. J. Advanced Res.	:	International Journal of Advanced Research
Int. J. Appl. Pure Sci. & Agric.	:	International Journal of Applied and Pure Science and Agriculture
Int. J. Appl. Res.	:	International Journal of Applied Research
Int. J. Basic & Appl. Med. Sci.	:	International Journal of Basic and Applied Medical Sciences
Int. J. Biodiv. Conserv.	:	International Journal of Biodiversity and Conservation
Int. J. Biodiv. Sci. & Manage.	:	International Journal of Biodiversity Science & Management
Int. J. Biodiv. Sci. Ecosyst. Serv. & Manage.	:	International Journal of Biodiversity Science, Ecosystem Services & Management
Int. J. Bio-resour. & Stress Manage.	:	International Journal of Bio-resource and Stress Management
Int. J. Bio. Sci. & Manage.	:	International Journal of Biological Sciences and Management
Int. J. Biol. Technol.	:	International Journal of Biological Technology
Int. J. Conserv. Sci.	:	International Journal of Conservation Science
Int. J. Curr. Microbiol. Appl. Sci.	:	International Journal of Current Microbiology and Applied Sciences
Int. J. Curr. Pharmaceut. Res.	:	International Journal of Current Pharmaceutical Research
Int. J. Curr. Res. Biosci. & Pl. Biol.	:	International Journal of Current Research in Biosciences and Plant Biology
Int. J. Ecol. & Environm. Sci.	:	International Journal of Ecology and Environmental Sciences
Int. J. Engineering Pure & Appl. Sci.	:	International Journal of Engineering, Pure and Applied Sciences
Int. J. Environm. Biol.	:	International Journal of Environmental Biology
Int. J. Food, Agric. & Veterinary Sci.	:	International Journal of Food, Agriculture and Veterinary Sciences
Int. J. Food & Fermentation Technol.	:	International Journal of Food and Fermentation Technology
Int. J. Fundamental & Appl. Sci.	:	International Journal of Fundamental and Applied Science
Int. J. Geology, Earth & Environm. Sci.	:	International Journal of Geology, Earth and Environmental Sciences
Int. J. Green & Herbal Chem.	:	International Journal of Green and Herbal Chemistry
Int. J. Herbal Med.	:	International Journal of Herbal Medicine

Int. J. Med. Aromat. Pl.	:	International Journal of Medicinal and Aromatic Plant
Int. J. Med. Photon	:	International Journal of Medicine Photon
Int. J. Pharm. & Pharmaceut. Sci.	:	International Journal of Pharmacy and Pharmaceutical Science
Int. J. Pharm. Technol. Res.	:	International Journal of Pharmacy and Technological Research
Int. J. Pharmaceut. Sci. Res.	:	International Journal of Pharmaceutical Science and Research
Int. J. Phytopathol.	:	International Journal of Phytopathology
Int. J. Res. Ayurveda & Pharma.	:	International Journal of Research in Ayurveda & Pharmacy
Int. J. Res. Pharmaceut. & Biosci.	:	International Journal of Research in Pharmaceutical and Biosciences
Int. J. Res. Pharm. & Chem.	:	International Journal of Research in Pharmacy and Chemistry
Int. J. Sci. & Res.	:	International Journal of Science and Research
Int. J. Sci. & Res. Publ.	:	International Journal of Science and Research Publications
Int. J. Sci. & Technol.	:	International Journal of Science and Technology
Int. J. Social Sci. Manage.	:	International Journal of Social Sciences and Management
Int. J. Theoretical & Appl. Sci.	:	International Journal of Theoretical and Applied Sciences
Int. J. Threatened Taxa	:	International Journal of Threatened Taxa
Int. J. Usuf. Manage.	:	International Journal Usufructs Management
Int. Lett. Nat. Sci.	:	International Letters of Natural Sciences
Int. Res. J. Biol. Sci.	:	International Research Journal of Biological Science
Invention Intelligence	:	Invention Intelligence
J. Acad. Indus. Res.	:	Journal of Academia and Industrial Research
J. Agric. Trop. Bot. Appl.	:	Journal d'Agriculture Tropicale et de Botanique Appliquée
J. American Sci.	:	Journal of American Science
J. Appl. & Nat. Sci.	:	Journal of Applied and Natural Science
J. Asiat. Soc. Bengal	:	The Journal of the Asiatic Society of Bengal
J. Ayurvedic & Herbal Med.	:	Journal of Ayurvedic and Herbal Medicine
J. Biodiv. & Endangered Sp.	:	Journal of Biodiversity and Endangered Species
J. Biodiv. Manage. & Forest.	:	Journal of Biodiversity Management & Forestry
J. Biol. Chem. Chron.	:	Journal of Biological and Chemical Chronicles
J. Bombay Nat. Hist. Soc.	:	Journal of the Bombay Natural History Society
J. Bot.	:	Journal of Botany
J. Ecol., Environm. & Conserv.	:	Journal of Ecology, Environment & Conservation

J. Econ. Taxon. Bot.	:	Journal of Economic and Taxonomic Botany
J. Environm. Sci., Computer Sci. Engineering & Technol.	:	Journal of Environmental Science, Computer Science and Engineering & Technology
J. Ethnobiol. & Ethnomed.	:	Journal of Ethnobiology & Ethnomedicine
J. Ethnobiol. & Tradit. Med.	:	Journal of Ethnobiology and Traditional Medicine
J. Ethnopharmacol.	:	Journal of Ethnopharmacology
J. Hill Res.	:	Journal of Hill Research
J. Human Ecol.	:	Journal of Human Ecology
J. Indian Bot. Soc.	:	The Journal of the Indian Botanical Society
J. Indian Soc. Remote Sensing	:	Journal of the Indian Society of Remote Sensing
J. Jap. Bot.	:	The Journal of Japanese Botany
J. Linn. Soc., Bot.	:	The Journal of the Linnean Society, Botany
J. Med. Pl. Res.	:	Journal of Medicinal Plant Research
J. Med. Pl. Stud.	:	Journal of Medicinal Plant Studies
J. Microbiol. Biotechnol. & Food Sci.	:	Journal of Microbiology, Biotechnology & Food Sciences
J. Mountain Sci.	:	Journal of Mountain Science
J. Mycol. Pl. Pathol.	:	The Journal of Mycology and Plant Pathology
J. Nat. Conserv.	:	Journal for Nature Conservation
J. New Biol. Rep.	:	Journal on New Biological Reports
J. Non-Timber Forest Prod.	:	Journal of Non-Timber Forest Products
J. Orchid Soc. India	:	The Journal of the Orchid Society of India
J. Phytol.	:	Journal of Phytology
J. Phytopathol. Pest Manage.	:	Journal of Phytopathology and Pest Management
J. Pl. Sci.	:	Journal of Plant Science
J. & Proc. Asiat. Soc. Bengal	:	Journal and Proceedings of the Asiatic Society of Bengal
J. Res. Indian Med.	:	Jounal of Research in Indian Medicine
J. Res. Pl. Sci.	:	Journal of Research in Plant Science
J. Simla Nat. Soc.	:	Journal of Simla Natural Society
J. Threatened Taxa	:	The Journal of Threatened Taxa
J. Trop. Forest.	:	Journal of Tropical Forestry
J. Trop. Med. Pl.	:	Journal of Tropical Medicinal Plant
Kavaka	:	Kavaka
Kew Bull.	:	Kew Bulletin
Life Sci. Leafl.	:	Life Sciences Leaflets
Med. Aromat. Pl.	:	Medicinal and Aromatic Plant
Nagarjun	:	Nagarjun
Nature & Sci.	:	Nature and Science
Nat. Areas J.	:	Natural Areas Journal

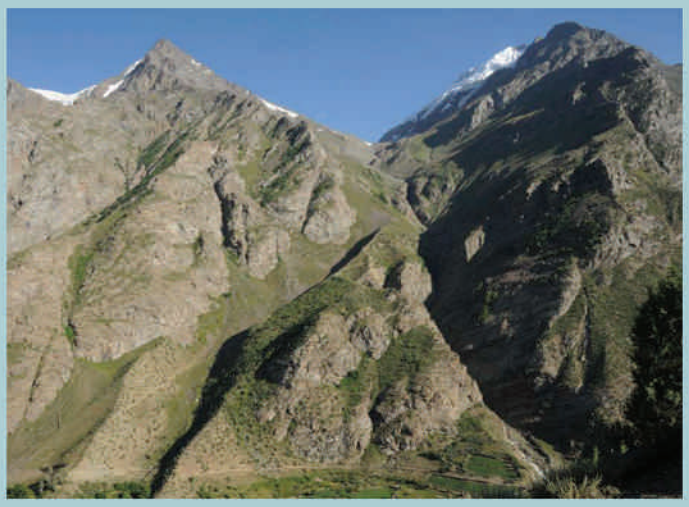
Nelumbo	:	Nelumbo (Vol. 51+, 2010+. Preceded by: Bulletin of the Botanical Survey of India)
Neo Botanica	:	Neo Botanica
New Botanist	:	New Botanist
New York Sci. J.	:	New York Science Journal
Nordic J. Bot.	:	Nordic Journal of Botany
Nova Hedwigia	:	Nova Hedwigia
Pakistan J. Biol. Sci.	:	Pakistan Journal of Biological Sciences
Pharma Tutor	:	Pharma Tutor
Pharmaceut. Biol.	:	Pharmaceutical Biology
Phykos	:	Phykos
Phytotaxa	:	Phytotaxa
Phytotaxonomy	:	Phytotaxonomy
Pl. Archives	:	Plant Archives
Pl. Pathol. & Quarantine	:	Plant Pathology & Quarantine
Pl. Sci. Today	:	Plant Science Today
Pl. Syst. & Evol.	:	Plant Systematics and Evolution
Pleione	:	Pleione
Polish Bot. J.	:	Polish Botanical Journal
Proc. Indian Natl. Sci. Acad.	:	Proceedings Indian National Science Academy
Proc. Natl. Acad. Sci. India	:	Proceedings of National Academy of Science, India
Quart. J. Crude Drug Res.	:	Quarterly Journal of Crude Drug Research
Recent Advances Pharmaceut. Sci. Res.	:	Recent Advances in Pharmaceutical Science Research
Rec. Bot. Surv. India	:	Records of Botanical Survey of India
Res. Bull. Punjab Univ., Sci.	:	Research Bulletin of the Punjab University, Science
Res. in Pharm.	:	Research in Pharmacy
Rheedea	:	Rheedea
Sci. & Cult.	:	Science & Culture
Sci. World J.	:	The Scientific World Journal
Studies in Fungi	:	Studies in Fungi
Studies Tribes & Tribals	:	Studies of Tribes & Tribals
The Palaeobotanist	:	The Palaeobotanist
Trans. Linn. Soc. London, Bot.	:	Transactions of the Linnean Society of London, Botany
Trop. Ecol.	:	Tropical Ecology
Umbellifereae Improvement Newsletter, USA	:	Umbellifereae Improvement Newsletter, USA
Van Vigyan	:	Van Vigyan
World J. Pharm. & Pharmaceut. Sci.	:	World Journal of Pharmacy and Pharmaceutical Science

AUTHOR INDEX WITH ABSTRACT NUMBER IN PARENTHESIS

Alpine vegetation in Lahul valley

Baralacha La Pass

Subalpine vegetation at Jispa



Alpine meadows in Lahul valley

Epilobium angustifolium

Rheum spiciformae

Saussurea bracteata

Waldheimia tomentosa

Photos: Kumar Ambrish