Asian J Biol Life Sci., 2025; 14(2):245-258.
https://ajbls.com

Review Article

A Review on Ethnobotanical Insights into the Medicinal Potential in District of Himachal Pradesh, India

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ABSTRACT

Background: Himachal Pradesh is a hilly state in Northwest India composed of a rich legacy of natural resources and ethnobotanical flora. This study examined the ethnomedicinal potential of the flora in several districts of Himachal Pradesh, an area rich in traditional healing practices and biodiversity. **Objectives:** The objective of this review was to encourage the sustainable utilization of the ethnomedicinal flora of Himachal Pradesh, emphasizing its potential for bioprospecting and cultural preservation. It aims to guarantee the ongoing relevance and preservation of these priceless biological treasures by encouraging cooperation between the local people and academics. **Methodology:** An ethnomedicinal review of Himachal Pradesh was conducted through the texts, research articles related to ethnomedicinal and traditional uses, phytochemistry, and therapeutic activities available on Pubmed, Science Direct, Google Scholars, Scopus, and Web of Science etc. **Results:** The study explores the distinct therapeutic applications of plant species that are employed by the local population to cure maladies, varying from respiratory problems to digestive disorders. This study highlighted the importance of wild plants for various purposes, including medicine, in this remote high-altitude region. The study also highlights the specialized knowledge and application of medicinal plants for specific health conditions in the region. **Conclusion:** Different plant species are displayed in each district, reflecting the differences in altitude, climate, and cultural customs. It also addresses issues such as habitat loss, climate change, and loss of traditional knowledge, highlighting the significance of conservation efforts. There is a noticeable decline in traditional knowledge, particularly among younger generations, due to modernization and changing lifestyles.

Keywords: Ethnomedicine, Flora, Himachal Pradesh, Medicinal plants, Traditional Health Practices.

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Received: 06-03-2025;
Revised: 28-04-2025;
Accepted: 19-06-2025.

INTRODUCTION

The area of India known as the Himalayan foothills is home to the state of Himachal Pradesh. The state has a broad range of temperatures owing to its unusual terrain and altitude, which in turn enables a diverse variety of plants to grow throughout the state. The Indian state of Himachal Pradesh is home to a diverse range of species, habitats, groups, populations, and ecosystems owing to its large altitudinal range. It is thought that over 3,400 distinct species of plants and animals can be found in Himachal Pradesh.[1] Over a thousand different plant species are known to be aromatic or beneficial. Since most of the population of Himachal Pradesh descends from a diverse spectrum of ethnic and cultural groupings, each of these communities has its own corpus of indigenous knowledge. Ancient people exploited the beneficial and medicinal qualities of plants in various ways, and the remedies were successful without posing any risk outcomes. The hilly state of Himachal Pradesh, which is tucked away in the western Himalayas, is located in the northwest Himalayan region between 30˚22′ 44″ N and 33˚ 12′ 44″ N latitude and 75˚45′ 44″ E and 79˚ 04′ 20″ E longitude. It covers an area of roughly 55,673 sq. km in North-western India.[2] The range of forms, habitats, functions, and phytochemicals found in plant species is wide. Approximately 1,500 species of aromatic and medicinal plants have been identified in the Himachal Pradesh of approximately 3,500 species of higher plants.[3]

METHODOLOGY

A literature survey was conducted consulting research articles published online to retrieve information on Ethnomedicinal, phytochemistry, Ethnobotany from accessible online databases, such as Pubmed, Science Direct, Google Scholar, Scopus and Web of Science and traditional texts related to Ethno-botany etc.

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ScienScript

DOI: 10.5530/ajbls.20251493

Publishing Partner : ScienScript Digital. [www.scienscript.com.sg]

Current Status of Medicinal Plants

The World Health Organization states that over 80% of the global population, or 4.3 billion people in developing countries, rely on plant-derived medicines for various ailments.[4] India's medicinal plants boast rich diversity, traditional use, and conservation concerns. Approximately 10,000 species are used medicinally,[5,6] forming the basis of traditional Indian medical systems used by over 70% of India's population. Challenges include a decline in traditional Vaidya's (practitioners), leading to knowledge loss in preparing traditional medicines. Many medicinal plants face extinction due to overexploitation and habitat loss, with 18 species categorized as rare, endangered, or vulnerable in the Kedarnath Wildlife Sanctuary alone.[7] The herbal trade suffers from substitution and adulteration issues, ranging from 20 to 100%, risking consumer health. Despite these challenges, conservation efforts are underway, with a list of 84 threatened medicinal plant species compiled to aid conservation. There is growing interest in validating traditional claims through scientific research and developing safe, effective herbal drugs. The medicinal plants sector offers opportunities to improve underprivileged communities' living standards while meeting the rising demand for herbal medicine.

Status of Ethnomedicinal potential in Himachal Pradesh

The northern Indian state of Himachal Pradesh is renowned for its abundant biodiversity that includes a wide range of therapeutic plants. Numerous plant species with medicinal qualities are found in 12 districts of the state: Kullu, Kangra, Mandi, Chamba, Solan, Bilaspur, Hamirpur, Una, Sirmaur, Kinnaur, Lahaul-Spiti, and Shimla (Figures 1 and 2).

Himachal Pradesh, the state is estimated to harbor around 1,500 medicinal plant species, with the number varying by district due to environmental factors like elevation, weather conditions, and ecosystem. For instance, the Kangra district is known for the widespread use of *Berberis aristata* (Indian barberry), *Swertia chirayita* (Chirayita), and *Withania somnifera* (Ashwagandha), while Kullu district is abundant in species such as *Valeriana wallichii* and *Gentiana kurroo*, both employed in treating stress-related ailments. Studies have underscored the medicinal importance of these species, highlighting their role in addressing various health issues, including gastrointestinal problems, respiratory conditions, and dermatological disorders.

Ethnobotanical Research in Districts of Himachal Pradesh

In Himachal Pradesh, ethnobotanical study is essential for recording traditional knowledge of therapeutic plants, especially among rural and tribal populations. These investigations have shown that different districts use a wide variety of plants to treat different illnesses.

A comprehensive study of Himachal Pradesh identified 643 species of medicinal plants, noting that the number of species decreased with increasing altitude.[8] In the Maraog region of Shimla district, 110 medicinal plant species belonging to 102 genera and 57 families were reported, with Rosaceae and Asteraceae being the most represented families.[8] Similarly, in the Kangra and Chamba districts, 73 plant species from 67 genera and 40 families were documented, with Asteraceae and Lamiaceae being the most prominent families.[9] The Churah subdivision of Chamba district reported 78 plants used to cure 13 ailments, with a focus on dermatological, respiratory, and digestive problems.[10] Interestingly, a comprehensive review of ethnomedicinal plants used specifically for treating jaundice in Himachal Pradesh revealed 87 plant species from 51 families.[11] Indigenous herbal remedies to cure skin disorders by natives of Lahaul-spiti, have been identified.[12] The Dharampur region in Solan district documented 115 medicinal plants, including 38 trees, 37 herbs, 34 shrubs, 5 climbers, 1 fern, and 1 grass.[13] The predominant family was Rosaceae with 10 species, followed by Asteraceae and Lamiaceae with 8 species each. Pangi Valley, an interior tribal area, reported 67 plant species from 59 genera and 36 families.[14] This study highlighted the importance of wild plants for various purposes, including medicine, in this remote high-altitude region. This highlights the specialized knowledge and application of medicinal plants for specific health conditions in the region. The current status of ethnomedicinal plant use in Himachal Pradesh faces several challenges. There is a noticeable decline in traditional knowledge, particularly among younger generations, due to modernization and changing lifestyles.[8,13] This trend is concerning as it may lead to the loss of valuable indigenous knowledge. Additionally, threats such as deforestation, agricultural expansion, and overgrazing pose risks to the natural habitats of these medicinal plants.[15,16]

In Hamirpur district of Himachal Pradesh, local communities have long relied on ethnomedicinal plants for various health benefits. These plants form an integral part of the area's cultural legacy, with traditional knowledge transmitted across generations. Residents of Hamirpur employ these botanical resources to address numerous health concerns, including cutaneous conditions, gastrointestinal disorders, and respiratory ailments.[17,18] Table 1 offers a list of ethnomedicinal plants found in Hamirpur district, providing their common names, scientific name, part use.[19] This compilation showcases the array of plant species and their medicinal uses as reported by the local communities.[20]

The Solan district boasts a diverse array of ethnomedicinal plants that are extensively utilized by local populations for addressing various health issues. This traditional knowledge has been transmitted across generations, becoming a crucial component of local healthcare practices. These botanical resources are primarily employed to treat common ailments including fevers,

Table 1: List of unique Ethnomedicinal Plants from the Districts of Himachal Pradesh.

Sl. No.	Scientific name	Family	Part used	Distribution	Ethnomedicinal use
1.	*Agave cantala*	Agavaceae	Leaves	Hamirpur	It has Antibacterial activity.
2.	*Aster falcatus*	Asteraceae	Flowers	Hamirpur	Act as an antimicrobial.
3.	*Argemone mexicana*	Papaveraceae	Oil, leaf juice, root	Hamirpur	Externally used for indolent ulcers and skin diseases. Root power is utilized in case of diabetes.
4.	*Agaricus campestris*	Agaricaceae	Fruit	Hamirpur	Help to enhance the immune system due to its nutritional value.
5.	*Artocarpus lakoocha* Buch. -Ham.	Moraceae	Leaves	Hamirpur	Leaves are used to treat wounds.
6.	*Adiantum capillus veneris* L.	Adiantaceae	Leaves	Hamirpur	Leaf decoction used to treat jaundice.
7.	*Aegle marmelos* Correa.	Rutaceae	Unripe fruit, root bark	Hamirpur	Unripe fruit aids digestion. Root bark treats fish poisoning and fever.
8.	*Albizzia lebbeck* Benth.	Mimosaceae	Bark, Leaves	Hamirpur	Root bark protects gum. Leaves are used to treat night blindness.
9.	*Ajuga integrifolia* Buch. -Ham.	Lamiaceae	Whole plant	Solan	Used to treat diarrhoea.
10.	*Achyranthes bidentata* Blume	Amaranthaceae	Seeds	Kullu	Seeds are boiled in 250 mL of water and used orally to colds, coughs and mouth ulcers.
11.	*Ainsliaea aptera* DC.	Asteraceae	Roots	Kullu	Root paste (2-3g) use to treat fever, constipation and stomach-ache (orally).
12.	*Anemone rivularis* Buch. -Ham. ex-DC.	Ranunculaceae	Roots	Kullu	Fresh root is put between aching teeth. Root piece is chewed for 4-5 min for toothache.
13.	*Artemisia nilagirica* (C. B. Clarke) Pamp.	Asteraceae	Seeds	Kullu	Seed oil is applied to swollen joints for arthritis, back pain, and bone fractures.
14.	*A. scoparia* Waldst. and Kit.	Asteraceae	Roots	Kullu	Root paste is consumed with lukewarm water to treat headache, earache, diarrhoea and vomiting.
15.	*Achyranthes bidentata* Blume	Amaranthaceae	Whole plant	Chamba	Whole plant is used to treat stomach pain.
16.	*Artemisia absinthium* L.	Asteraceae	Leaves	Chamba	Leaf paste applied on cuts or wounds.
17.	*Adhatoda vasica* Nees	Acanthaceae	Leaves	Kangra	Leaf poultice applied as a body pain remedy.
18.	*Arctium lappa* Linn.	Asteraceae	Roots	Kangra	Root paste administered externally to treat skin conditions.
19.	*Aesculus indica*	Hippocastanaceae	Fruit	Kangra	Small amount of dried paste is eaten as halwa, a traditional food to treat leukorrhea.
20.	*Allium cepa* L.	Alliaceae	Bulbs	Mandi	Bulbs are used to prevent allergies and cleanse the blood.
21.	*Asparagus adscendens* Roxb.	Asparagaceae	Root tubers	Mandi	Milk, powdered roots were given to promote immunity, and strength.
22.	*Abies pindrow* (Royle ex D. Don)	Pinaceae	Leaves	Shimla	To treat milk clotting, cows' udders are treated with leaf paste.

Sl. No.	Scientific name	Family	Part used	Distribution	Ethnomedicinal use
23.	*Adiantum venustum* D. Don	Pteridaceae	Leaves	Shimla	Leaf paste applied to promote quick healing of persistent tumours.
24.	*Ajuga parviflora* Benth.	Lamiaceae	Aerial part	Shimla	Powder from aerial part and edible oil used to treat cattle skin wounds.
25.	*Amaranthus blitum* L.	Amaranthaceae	Leaves	Shimla	Leaf paste use to treat dysentery, diarrhoea and skin infections.
26.	*Androsace sarmentosa* Wall.	Primulaceae	Leaves	Shimla	Leaf paste is administered to treat skin disease.
27.	*Artemisia vestita* Wall. Ex Besser	Asteraceae	Leaves, Flower	Shimla	Wounds are treated with flowers and leaf paste.
28.	*Aruncus dioicus* (Walter) Fernald	Rosaceae	Roots	Shimla	Roots mixed with warm water are used to stop bleeding after birth. Diarrhoea and stomach aches can be cured with root paste.
29.	*Asplenium dalhousiae* Hook.	Aspleniaceae	Whole plant	Shimla	Whole plant is use to cure skin diseases caused by bacteria.
30.	*Aconitum violaceum*	Ranunculaceae	Roots	Lahul-spiti	Root used to cure fever, respiratory issues, and grass poisoning. Powdered roots of *Aconitum violaceum*, fruits of *Terminalia chebula*, rock salt, and musk with water are applied topically to treat grass poisoning.
31.	*Arnebia euchroma*	Boraginaceae	Root, leaves	Lahul-spiti	Roots treat cuts, wounds, fever and skin conditions. Animals are fed *Arnebia euchroma* leaves with grass for fever and cough.
32.	*Allium carolinianum*	Aliaceae	Leaves	Lahul-spiti	Leaf powder is used to treat fever and colds in animal. Leaf decoction is given orally to boost immunity and treat restlessness.
33.	*Abies spectabilis*	Pinaceae	Leaves	Sirmour	Warm decoction is used to treat chronic bronchitis (For 15 days).
34.	*Aconitum deinorrhizum*	Ranunculaceae	Roots	Sirmour	The root is smoked to ease stomach pain. Root powder with mustard oil used to massaged paralyzed body and rheumatic joints.
35.	*Ajuga bracteosa*	Lamiaceae	Leaves	Sirmour	Fresh leaf paste is applied to get rid of lice.
36.	*Amaranthus caudatus*	Amaranthecae	Leaves	Sirmour	Fresh leaf juice combined with curd is taken orally to treat intestinal wall irritation.
37.	*Arnebia enchroma*	Boraginaceae	Roots	Sirmour	Powdered root is used to cure toothache and ear pain.
38.	*Argemone maxicana*	Papaveraceae	Root, Seeds	Sirmour	Ground roots with onions expel guinea worms immediately. Women use root tea for fertility control.
39.	*Andrographis paniculata* (Burm.f). Wall. Ex Nees	Acanthaceae	Whole plant	Una	Roots and leaves treat fevers, muscle swells, urinary infections, and gastrointestinal problems.

Sl. No.	Scientific name	Family	Part used	Distribution	Ethnomedicinal use
40.	*Bidens pilosa*	Compositae	Leaves	Hamirpur	Used on swollen glands and ulcers.
41.	*Berberis variegata* L.	Fabaceae	Roots, Buds	Solan	Roots are utilized to provide an antidote against snake poisoning. Dried buds are useful for dysentery.
43.	*Berberis glaucocarpa* Stapf	Berberidaceae	Mature fruits	Kullu	Mature dried fruit paste is taken orally with warm milk to relieve menorrhagia.
44.	*Bidens biternata*	Asteraceae	Flowers, fruits	Kullu	Cuts, burns, wounds, and mouth ulcers can all be treated with dried flowers and fruits.
45.	*Bacopa monnieri* (L.) Wettst.	Scrophulariaceae	Leaves	Chamba	Leaf juice consumed to improve memory, reduce anxiety or fatigue.
46.	*Bergenia ligulata* (Wall.) Engl.	Saxifragaceae	Leaves	Chamba	Leaves are used to cure cold.
47.	*Boerhavia diffusa* Linn.	Nyctaginaceae	Root, Leaf	Kangra	Root paste with honey to cure cough. Leaves are useful for body pain.
48.	*Bombax ceiba* Linn.	Bombacaceae	Root	Kangra	Roots used for asthma and piles.
49.	*Bryonopsis laciniosa* Linn.	Cucurbitaceae	Seeds	Kangra	Seeds are used to fever and flatulence.
50.	*Bryophyllum pinnatum* Linn.	Crassulaceae	Leaves	Bilaspur	Used to treat kidney stones.
60.	*Boenninghausenia albiflora* (Hk.) Reichb.	Rutaceae	Root	Mandi	Used as Antiseptic on wounds.
61.	*Bergenia ciliata* (Haw.) Sternb.	Saxifragaceae	Leaves, Root	Shimla	Leaf or root paste applied to treat wound.
62.	*Bromus hordeaceus* L.	Poaceae	Whole plant	Shimla	They are high in nutrients; plants are fed to cattle.
63.	*Buddleja crispa* Benth	Scrophulariaceae	Leaves	Shimla	Fresh leaves used to treat diarrhoea and colds.
64.	*Bunium persicum*	Apiaceae	Seeds	Lahul-spiti	Seed powder fed to animals in case of dysentery.
65.	*Brassica campestris*	Brassicaceae	Leaf, seeds	Lahul-spiti	Seeds are used to treat skin conditions, FMD, teat cracks, and horn break. Teat cracks are treated with mustard oil, wild apricot oil, and *Curcuma longa* powder.
66.	*Berberis chitria* D. Don	Berberidaceae	Roots	Kinnaur	Roots are heated in water, sieved, and then mixed with a solution used to treat eye issues.
67.	*Butea monosperma*	Papilianaceae	Leaves, Bark	Sirmour	Fresh leaf juice is given orally to treat glycosuria. Powdered bark is use to cure menstrual disturbances.
67.	*Barleria prionitis* Linn.	Acanthaceae	Leaf, bark, root	Una	Leaf juices with coconut oil are applied on pimples. Root paste is applied to boils and swellings. Dried bark mixed with honey treats asthma.
68.	*Barleria cristata* Linn.	Acanthaceae	Root, leaf	Una	Leaves and roots are used to cure boils, gland swelling, and asthma. Root juice is used to treat cardiac issues.
69.	*Cycas revoluta*	Cycadaceae	Roots	Hamirpur	It is used as expectorant, tonic.

Sl. No.	Scientific name	Family	Part used	Distribution	Ethnomedicinal use
70.	*Callistemon viminalis*	Myrtaceae	Whole plant	Solan	Whole plant is used to cure diarrhoea and bladder infections.
71.	*Clinopodium vulgare* L.	Lamiaceae	Leaves	Solan	Leaves are applied topically to cuts and wounds.
72.	*Cynodon dactylon*	Poaceae	Leaves	Solan	Leaves are used to cure hypertension, dysentery and cancer.
73.	*Cardamine impatiens* L.	Brassicaceae	Roots	Kullu	Dried roots are used to treat fever, cough, asthma, and as a diuretic and stimulant.
74.	*Chenopodium album* L.	Chenopodiaceae	Leaves, stems	Kullu	Leaves are used to treat hypothermia. Also used as stimulant and blood purifier.
75.	*Conyza japonica* (Thunb.) Less.	Asteraceae	Leaves	Kullu	Leaf paste is used to treat leukoderma, eczema, itching, and jaundice.
76.	*Corydalis cornuta* Royle	Fumariaceae	Fresh leaves	Kullu	Leaf juice promotes faster healing from bone fractures and damaged ligaments.
77.	*Cynoglossum lanceolatum* Forssk. (=C. micranthum Desf.)	Boraginaceae	Whole plant	Kullu	Whole plant is used to treat urinary problems, anaemia and infertility.
78.	*Centratherum anthelminticum* Kuntze.	Asteraceae	Seed	Kangra	Eat roasted seeds with jaggary to treat acid reflux and other digestive issues.
79.	*Cordia dichotoma* Forst. f.	Cordiaceae	Leaf	Kangra	Honey with leaf ashes is advised for constipation.
80.	*Cymbopogon martini* Stapf.	Poaceae	Root, Leaves	Kangra	Leaves and roots as a successful treatment for clogged urine.
81.	*Coriandrum sativum* Linn.	Apiaceae	Whole plant	Kangra	It is used in Bleed piles, colic, flatulence, chicken pox.
82.	*Colocasia esculenta* Schott.	Araceae	Leaf, Flower, Tuber	Bilaspur	Utilized for atrophy, bronchial diseases, cough, burns and bee stings.
83.	*Calotropis procera* Linn.	Asclepiadaceae	Leaves, flowers	Bilaspur	Abortifacient, spasmogenic and carminative, bronchial asthma and skin diseases.
84.	*Carica papaya* Linn.	Caricaceae	Fruit, seeds	Bilaspur	Used in case of cutaneous infection, stomach ailments.
85.	*Capsicum annuum* Linn.	Solanaceae	Fruit	Bilaspur	Fruit is used to treat liver indurations.
86.	*Citrus trifoliate* Linn.	Rutaceae	Fruits, leaves	Bilaspur	Therapy for inflammatory allergic reactions.
87.	*Carissa opaca* Stapf ex Haines	Apocyanaceae	Fruits, roots, leaves	Bilaspur	Eliminate worms from cow wounds and serve as an intermediary in purgative preparation.
88.	*Cinnamomum tamala* (Buch. -Ham.) T.Nees and Eberm.	Lauraceae	Leaves	Mandi	Used to treat colds and coughs.
89.	*Citrus limon* (L.) Burm. F.	Rutaceae	Fruit	Mandi	Juice is used to strengthen immunity and provide defence against colds and coughs.
90.	*Citrus maxima* (Burm.) Osbeck	Rutaceae	Fruit	Mandi	Raw fruit protect from cold and cough.

Sl. No.	Scientific name	Family	Part used	Distribution	Ethnomedicinal use
91.	*Capsella bursa-pastoris* (L.) Medik.	Brassicaceae	Leaves	Shimla	Wounds are treated with leaf paste.
92.	*Cirsium arvense* (L.) Scop.	Asteraceae	Whole plant	Shimla	Used as feed for ruminants.
93.	*Clematis buchananiana* DC.	Ranunculaceae	Whole plant	Shimla	Wounds are treated with plant paste.
94.	*Coriaria nepalensis* Wall.	Coriariaceae	Leaves, Fruit	Shimla	Dysentery is treated by ripe fruits and fresh leaves.
95.	*Cirsium arvense*	Asteraceae	Whole plant	Lahul-spiti	The plant is given to the animal with salt water for diarrhoea.
96.	*Coussinia thomsonii*	Asteraceae	Roots	Lahul-spiti	Root powder (50g) mixed in water is applied to livestock with swollen limbs.
97.	*Cassiope fastigiata* (Wall.) D. Don	Ericaceae	Flower	Kinnaur	Flower tea helps to improve the digestive system.
98.	*Calotropis gigantea*	Ascelpiadaceae	Flower, Latex	Sirmour	Flower powder is inhaled in case of cough. For ringworm and scabies, fresh milky latex is applied topically.
99.	*Cassia tora*	Fabaceae	Seeds	Sirmour	For eczema and other skin conditions, seeds with mustard oil and turmeric are ground into a paste and applied.
100.	*Cuscuta reflexa*	Convolvulaceae	Stem	Sirmour	To induce abortion during the early stages of pregnancy, stem and a small amount of lime is administered.
101.	*Carissa spinarum* Linn.	Apocyanaceae	Leaf, Root	Una	Fresh leaves relieve upset stomach. Root paste is used for fever and inflammation.
102.	*Catharanthus roseus* (Linn.) G. Don.	Apocynaceae	Whole plant	Una	Possessing anti-cancer qualities; more beneficial in the treatment of leukaemia; utilized as a heart tonic.
103.	*Cordia dichotoma* G. Forst.	Boraginaceae	Fruit, leaf, bark	Una	Fruits are recommended for burning and dry cough. Used to treat urinary tract and chest disorders. Fever can benefit from the bark's decoction.
104.	*Cassia fistula* Linn.	Fabaceae	Fruit,	Una	Fruit pulp is used to treat fever, bacterial and fungal skin infections, constipation, pustules, leprosy, and cough blockages in the thoracic cavity.
105.	*Cassia tora* Linn.	Fabaceae	Whole plant	Sirmour	Juvenile leaves are used to ward against skin conditions. Seed powder is thought to have anti-inflammatory and blood-purifying properties.
106.	*Crataeva nurvala* Buch. - Ham.	Capparaceae	Bark, Root,	Una	The treatment for urinary tract infections involves bark. For cervical adenitis, the roots are decocted with honey.
107.	*Cheilanthes albomarginata* C.B.	Cheilanthaceae	Whole plant	Una	It is used to treat antifungal infections and tuberculosis.
108.	*Convolvulus microphyllus* Sieb. Ex. Spreng	Convolvulaceae	Whole plant	Una	Utilized as a tonic to support intelligence or brain power.

Sl. No.	Scientific name	Family	Part used	Distribution	Ethnomedicinal use
109.	*Datura innoxia*	Solanaceae	Whole Plant	Solan	Whole plant is used to relieve physical pain, fever and diarrhoea.
110.	*Debregeasia longifolia*	Urticaceae	Leaves	Solan	Leaves are used to relieve indigestion and dysentery.
111.	*Delphinium denudatum* Wall. ex-Hook. f. and Thoms. (=D. pauciflorum Royle)	Ranunculaceae	Rhizome	Kullu	Dried rhizome powder is administered with heated cow's milk to treat hypothermia and constipation.
112.	*Dicliptera bupleuroides* Nees	Acanthaceae	Fresh leaves	Kullu	To cease the bleeding, fresh leaves are applied to the cut wound.
113.	*Dolichos uniflorus* Lank.	Fabaceae	Seeds	Kangra	Kidney stones are dissolved by consuming a seed decoction.
114.	*Didymocarpus pedicellata* R. Br.	Gesneriaceae	Leaves	Kangra	Leaf decoction is used to treat arthritis.
115.	*Daucus carota* Linn.	Apiaceae	Leaf, Tuber	Bilaspur	Used in case of child birth.
116.	*Dioscorea deltoidea* Wall. ex Kunth	Dioscoreaceae	Tuber	Mandi	Used to treat piles.
117.	*Daphne papyracea* Wall. ex G. Don	Thymelaeaceae	Aerial parts	Mandi	Aerial parts used in case of stomach discomfort.
118.	*Desmodium elegans* DC.	Fabaceae	Leaves	Shimla	Fodder is made from fresh leaves.
119.	*Deutzia scabra* Thunb.	Hydrangeaceae	Leaves	Shimla	Leaf paste is beneficial for treating skin diseases.
120.	*Diplazium esculentum* (Retz.) Sw	Athyriaceae	Leaves	Shimla	Boiled leaves help to prevent diarrhoea.
121.	*Dioscorea deltoidea* Wall.	Dioscoreaceae	Roots	Kinnaur	Use to treat cough and wounds.
122.	*Dalbergia sissoo*	Fabaceae	Leaves	Sirmour	Leaf decoction is used as a stimulant, to treat urinary tract infections, and as a blood purifier.
123.	*Duchesnea indica*	Rosaceae	Leaves	Sirmour	Leaf pastes apples to cure cuts, wounds and skin conditions.
124.	*Eclipta alba* (Linn.) Hassk.	Asteraceae	Leaves	Kangra	Black pepper and dry leaves combined are used against piles.
125.	*Euphorbia geniculata* Ort. ex Boiss.	Euphorbiaceae	Leaves	Kangra	Leaf pastes for the treatment of leukoderma.
126.	*Euphorbia hirta* Linn.	Euphorbiaceae	Leaves	Kangra	Chewing leaves to treat diarrhoea.
127.	*Eucalyptus heterostemones* Benth.	Myrtaceae	Leaves	Bilaspur	Head is massaged with leaf oil to treat headache.
128.	*Erigeron bonariensis* L.	Asteraceae	Leaves	Shimla	Leaves are used to cure urinary tract infections.
129.	*Ephedra gerardiana* Wall. ex-Florin	Ephedraceae	Fruits	Kinnaur	Fruits are laxative.
130.	*Eremurus himaluicus*	Asphodelaceae	Leaves	Sirmour	Leaves are consumed in cases of anaemia.
131.	*Fumaria parviflora* Lam	Fumariaceae	Whole plant	Hamirpur	Dried plants have aperian, diuretic, anthelmintic, and fever-lowering properties.

Sl. No.	Scientific name	Family	Part used	Distribution	Ethnomedicinal use
132.	*Ficus auriculata*	Moraceae	Stem, Fruits	Solan	Stem latex applied on cuts and wounds. Diarrhoea and dysentery are treated with fruits.
133.	*Fagopyrum acutatum*	Polygonaceae	Leaves	Shimla	On skin diseases, leaf paste is administered.
134.	*Fragaria virginiana* Mill.	Rosaceae	Root, Leaves	Shimla	Root and leaf paste applied on cuts and wounds.
135.	*Gentiana kurroo Royle*	Gentianaceae	Leaves	Kullu	Leaf decoction administered orally in case of fever.
136.	*Holarrhena antidysenterica* Wall.	Apocynaceae	Bark	Hamirpur	Bark powder is applied to the body in a dropsy manner.
137.	*Habenaria pectinata*	Orchidaceae	Tubers	Sirmour	Tuber is taken with Khoya greater cardamom, jaggery and jaggery for joint pain.
138.	*Jasminum grandiflorum* Linn.	Oleaceae	Flower	Hamirpur	Flowers treat headaches, weak eyes and scorpion stings. Chewing leaves heals mouth ulcers.
139.	*Juncus effusus* L.	Juncaceae	Leaves	Shimla	Urinary tract infections are treated with fresh leaves.
140.	*Morus nigra* L.	Moraceae	Leaves, Roots	Solan	Leaves are applied to cure eye infections. Roots are used to treat diabetes and hypertension.
141.	*Murraya koenigii* (L.) Spreng.	Rutaceae	Leaves	Solan	Diabetes and dyspepsia are treated with the leaf extract.
142.	*Mucuna pruriens* DC.	Fabaceae	Seed	Kangra	Fried seeds in ghee are used to treat obesity. Use of seed soup for headaches.
143.	*Ocimum gratissimum* Linn.	Lamiaceae	Whole plant	Hamirpur	Oil enhances appetite. Leaves boost the number of sperm.
144.	*Olea europaea* L.	Oleaceae	Fruit, Leaves	Solan	Fruit and leaf decoction used to treat lung and urinary tract infections.
145.	*Opuntia stricta* (Haw.)	Cactaceae	Fruit	Una	Fruits can help treat gonorrhoea.
146.	*Pyrus communis*	Rosaceae	Fruits	Hamirpur	Helps in maintaining acid balance in the body.
147.	*Phoenix sylvestris* Linn.	Arecaceae	Fruits	Bilaspur	Treating thirst, fever and general debility.
148.	*Prunus armeniaca* Linn.	Rosaceae	Leaves	Bilaspur	Used in case of Cancer, diabetes and constipation.
149.	*Ricinus communis* Linn.	Euphorbiaceae	Seeds, leaves	Hamirpur	Leaves treat stomach ache, paralysis, jaundice and prevent abortion. Filariasis and contraception use seed kernels.
150.	*Rumex dentatus* Wall.	Polygonaceae	Root	Chamba	Root is used against any type of poison.
151.	*Rubus ellipticus* Linn.	Rosaceae	Root	Chamba	Root juice is used to treat diarrhoea, dysentery and gastrointestinal issue.
152.	*Sapindus mukorossi* Gaertn.	Sapindaceae	Fruit	Hamirpur	Fruit is utilized in epilepsy and salivation as an expectorant. Moreover, as fish poison.
153.	*Silene vulgaris* (Moench) Garcke	Caryophyllaceae	Whole plant	Kullu	Whole plant thought to have digestive properties and to be beneficial when treated cold.

Sl. No.	Scientific name	Family	Part used	Distribution	Ethnomedicinal use
154.	*Salvia lanata* Roxb.	Lamiaceae	Root, Leaves	Mandi	Astringent, colic, cold, coughs.
155.	*Salix daphnoides*	Salicaceae	Leaves	Lahul-spiti	When animals with foot disease (FMD) are treated with fresh leaf extract, lesions heal more quickly if the disease occurs in winter.
156.	*Thuja orientalis* L.	Cupressaceae	Leaves	Solan	Leaves are used to treat skin infections.
157.	*Taraxacum officinale* Wigg.	Asteraceae	Leaves	Kullu	Leaf paste is said to have diuretic and blood-purifying properties.
158.	*Taxus baccata* Thunb.	Taxaceae	Leaves, bark	Chamba	Plant is considered as having the cancer treatment properties.
159.	*Thymus serpyllum* L.	Lamiaceae	Seeds	Kinnaur	Dried leaves and seed are used to treat gastrointestinal problems.
160.	*Urtica dioica* L.	Urticaceae	Leaves	Chamba	Leaf decoction uses to cure skin disease.
161.	*Vitex negundo* L.	Lamiaceae	Leaves	Solan	Cough is relieved by inhaling leaf smoke.
162.	*Vitis vinifera* Linn.	Vitaceae	Fruit, Leaves	Bilaspur	Medicinal (Boils, toothache, epilepsy).
163.	*Waldhamia tomentosa*	Asteraceae	Whole plant	Lahul-spiti	Used in case of rheumatic arthritis.
164.	*Ziziphus nummularia*	Rhamnaceae	Leaves	Solan	Leaves are used to treat skin infections.

headaches, injuries, and gastrointestinal problems.[21-23] Kullu district is renowned for its wealth of ethnomedicinal plant species, which have been crucial to the local community's health practices for generations. The area's varied landscape and climate support a diverse array of plants, many of which are employed to address health issues such as respiratory problems, arthritis, gastrointestinal disorders, and dermatological conditions.[24] This utilization of plants not only demonstrates the community's intimate relationship with their environment but also provides valuable leads for potential therapeutic compounds.[25,26] In Chamba district, a wealth of medicinal plant species reported that have been employed by indigenous populations for generations. These botanical resources play a crucial role in the area's traditional health practices, providing natural treatments for various ailments including fevers, respiratory issues, injuries, and gastrointestinal disorders.[27,28] A compilation of ethnomedicinal plants from the Chamba district is presented in Table, which includes their scientific nomenclature, and principal medicinal applications.[29]

In Himachal Pradesh's Kangra district, a diverse range of plants forms of medicinal importance forms integral part of local healthcare practices. These botanical resources are utilized to address various health concerns, including headaches, fevers, injuries, gastrointestinal problems, and respiratory conditions.[30,31] A compilation of ethnomedicinal plants found in Kangra district is presented in Table, which includes their scientific nomenclature as well as their primary medicinal applications.[32] The Bilaspur district is renowned for its diverse ecosystem, especially its abundance of ethnomedicinal plants that have been crucial to local health practices for generations. These botanical resources are extensively utilized to address various health concerns, including respiratory problems, dermatological conditions, gastrointestinal issues, and pain management.[33,34] Table 1 presents a comprehensive inventory of ethnomedicinal plants found in the Bilaspur district scientific nomenclature as well as their principal medicinal applications.[35] This compilation emphasizes the curative properties of these plants and accentuates their significance in traditional healing practices, providing a basis for further scientific inquiry. Whereas, Mandi district is famous for its wide array of ethnomedicinal plants, which form an essential component of the area's traditional health care practices. These plants are employed by local populations to address various health issues, including problems related to breathing, digestion, skin, and infections.[36] The abundant plant diversity in Mandi district presents considerable opportunities for identifying new therapeutic compounds and natural treatments.[37] This compilation includes their vernacular names, scientific appellations, and principal medicinal applications.[38] Districts like Shimla, Lahaul-spiti, Kinnaur, Sirmour, and Una each play a significant role in the area's extensive tradition of using ethnomedicinal plants. Local populations in these regions depend on various plant species to address a broad spectrum of health concerns. Shimla's indigenous flora is frequently employed to treat conditions like fever, skin problems, and gastrointestinal issues.[39-41] The hardy plants of Lahaul-spiti are renowned for their effectiveness in managing respiratory ailments and injuries.[42,43] Kinnaur is notable for its plants that alleviate symptoms such as headaches and joint discomfort,[44,45] while Sirmour's botanical resources are applied to a range of common health problems, including fever and digestive disorders.[46,47] Una district harbours numerous medicinal plants used for both preventative

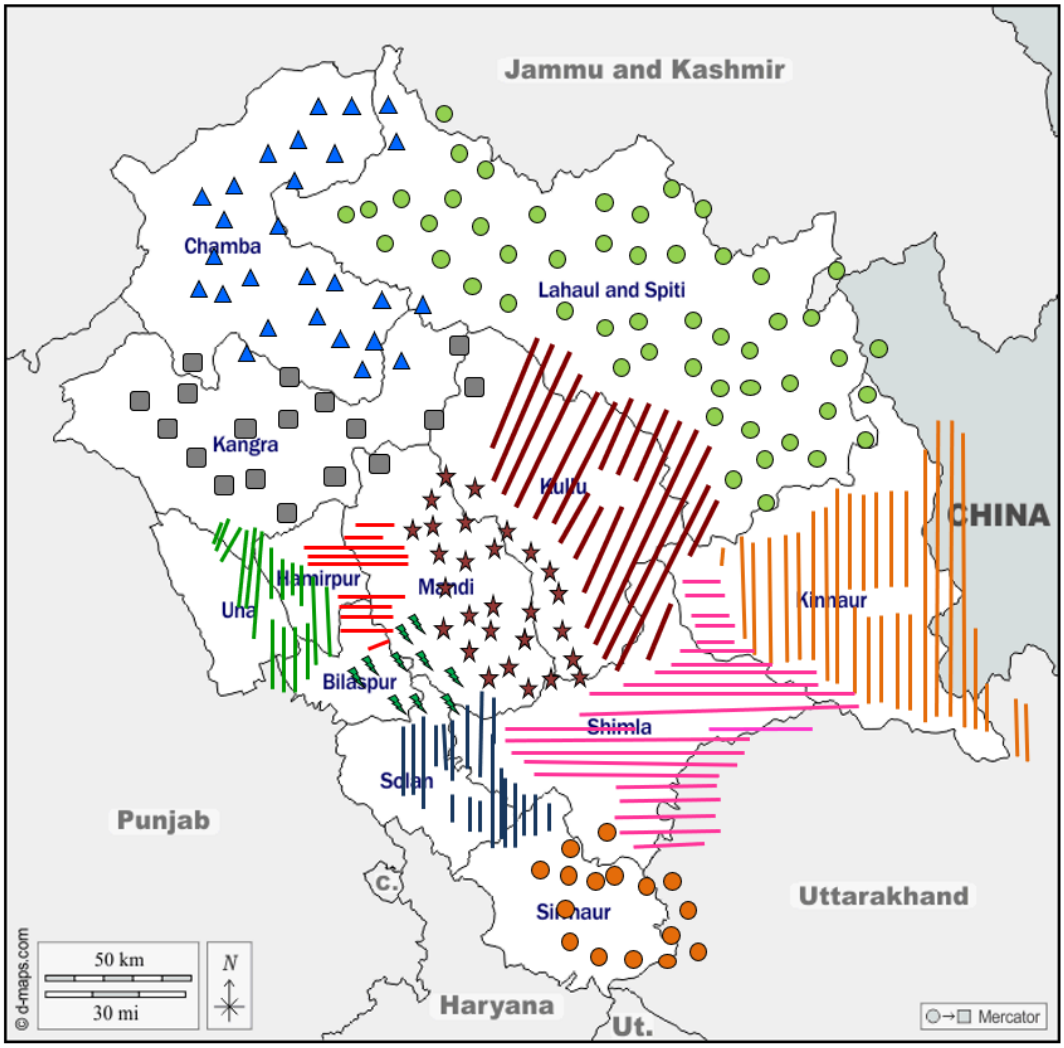
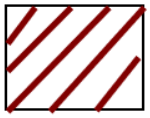


Figure 1: Districts of Himachal Pradesh.

Legends	Medicinal plants
	Ashwagandha, Neem, Rhododendron, Euphorbia, Aegle, Calotropis, Lakoocha, Doddar, Sankhiru, Chameli, Inderjoe, Kutaj.
	Ghabuti, Kashmal, Neelkanthi, Brahmi, Dhrub, Sansaru, Kari patta, Kahu, Tamakhu, Dhawai, Banafsha, Jamun.
	Gandana, Okalbuti, Kadvi-Booti, Choru, Lumb, Mrigu, Bathua, Lassari, Ratanjot, Mogri, Jangli pudina, Khatti-Meethi.

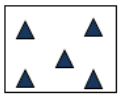
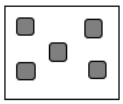
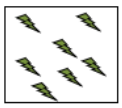
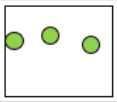
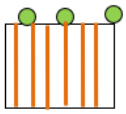
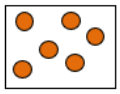
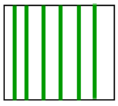
	Puthknda, Chura, Saapaya, Banhaldi, Banhaldi, Amla, Kinus, Katimithi, Chirand, Nagchatri, Shamak, Trimiria.
	Puthkanda, Gurbini, Chdenu, Shivlingi, Patindu, Makora gha, Musa-Karni, Badi dudhli, Bhumiamla, Patajen.
	Garlic, Dhania, Saunf, Aakh, Papaya, Akash bail, Garnu, Bitter orange, Chitta toot, Apricot, Jou / joui, Arjun.
	Gandhana, Sahasrapaii, Citrus, Chakotra, Baramaasi Tulsi, Banafsha, Amla, Singlimingli, Lukundadu, Pissumar.
	Sukhichalayi, Chamber, Phoolru, Daclambu, Khandwa, Baruvaa, Suniya, Ramban, Bhumbal, Sheliya.
	Bhonkarpo, Honglen, Sia zeera, Vumbureral , Tultang, Panchitowo, Tseri-sa, Wild thyme, Pipjul, Kochey.
	Chatar, Chutrum, La-pattary, Lau, Bhojpatr, Shak, Makhoo zeera, Asmania, Cheyarn, Pudina, Bankakadi.
	Ratti, Puthkanda, Latjera, Khair, Chauli, Bharbhand, Rasont, Kushmol, Dhak Palash, Chokar, Chirchita.
	Shankhpushpi, Lassoda, Nagphany, Chatak Chandni, Utakatera, Kakrondha, Sadabahar, Raktajhinti, Kalmegh, Puthkanda.

Figure 2: Medicinal plants distribution in all districts of Himachal Pradesh.

and curative purposes, addressing skin diseases, infections, and wounds.[48,49]

Each of the state's 12 districts boasts a diverse array of plant species with unique medicinal properties, deeply rooted in traditional healing methods. Table 1 presents a summary of district-specific unique ethnomedicinal plants.

CONCLUSION

Himachal Pradesh's ethnomedicinal flora holds great promise for medical treatment and pharmaceutical research. Local populations have long used the diverse plant species in this biodiverse region to treat various illnesses. The reported ethnobotanical activities reflect a cultural legacy worth preserving, showing a deep understanding of these plants' therapeutic properties. Investigating pharmacological properties may yield new molecules with medical applications. Combining traditional knowledge with modern scientific techniques can enhance drug development and promote sustainable resource use. However, habitat loss and climate change threaten these valuable plant species and must be addressed. Sustainable harvesting, conservation strategies, and systematic documentation should be prioritized in future studies. Collaborating among local populations, researchers, and policymakers can preserve ethnomedicinal knowledge while advancing scientific understanding. Utilizing Himachal Pradesh's flora's ethnomedical potential can support biodiversity preservation and cultural sustainability, aiding solutions for global health challenges.

ACKNOWLEDGEMNT

Special thanks to Head of Department and Chandigarh University for helping for the study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

DPPH: 2,2-diphenyl-1-picrylhydrazyl; **OH:** Hydroxyl radical; **COX:** Cyclooxygenase; **LOX:** Lipoxygenase; **MTT:** 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay; **PLA2:** Phospholipase A2; **WHO:** World Health Organization; **API:** Active Pharmaceutical Ingredient; **FMD:** Foot and Mouth Disease; **DNA:** Deoxyribonucleic Acid; **HP:** Himachal Pradesh; **HPLC:** High Performance Liquid Chromatography; **UV:** Ultraviolet; **API:** Active Pharmaceutical Ingredient; **IC_{50}:** Half maximal inhibitory concentration; **ROS:** Reactive Oxygen Species; **NSAIDs:** Non-Steroidal Anti-Inflammatory Drugs; **DNA:** Deoxyribonucleic Acid; **HPLC:** High Performance Liquid Chromatography; **API:** Active Pharmaceutical Ingredient.

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Cite this article: Koundal A, Attri LK. A Review on Ethnobotanical Insights into the Medicinal Potential in District of Himachal Pradesh, India. Asian J Biol Life Sci. 2025;14(2):245-58.