



## Traditional knowledge of people on ethnomedicinal plants in a part of Garhwal Himalaya, India

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### Abstract

The present investigation was conducted in the Joshimath block of Chamoli district. During the phytosociological investigation along with altitudinal gradients, some plant specimens were collected from forest stands and then locally identified with their uses with the help of locals experienced persons as well as Vaidyas of the area. At the same time some plants of surroundings were also listed with the help of locals regarding the ethno-medicinal use. A total of 57 plant species belonging to 38 families of medicinal plants with their value was recorded. Among these plant species about 53% herb, 25% shrubs, 19% trees, 2% climbers and 1% of fern were used in different health care systems such as diarrhea, dysentery, fever, painful inflammations, coughs, asthma, bronchitis, digestive problems, diabetes, fever, and exhaustion, leucorrhea, leprosy, piles, stomach complaints, ulcer, arthritis, wound, cholera, liver complaints, body swelling, tumour, malaria, rheumatic pain, skin ailments, swelling, tonic, eye diseases, stroke, and paralysis, in cold and pain of the stomach, menstrual disorder, urine complaints, bronchitis, etc. Anthropogenic pressure and changing climatic conditions were the major problems of the area, due to these effects, the diversity of medicinal flora and other associate species is decreasing. There is a need to create awareness among the people of the area to reduce these impacts so that the existence of the plants remains and the local people get the benefit for a long time.

**Keywords:** phytosociology, identification, ethno-medicinal plants, Garhwal Himalaya

### 1. Introduction

The northern part of India harbors a great diversity of medicinal plants because of the majestic Himalayan range. So far, about 8000 species of angiosperms, 44 species of gymnosperms, and 600 species of pteridophytes have been reported in the Indian Himalaya. <sup>[1]</sup> Of these, 1748 species are used as medicinal plants <sup>[2]</sup>, and the maximum number of species used as medicines has been reported from Uttarakhand. <sup>[3]</sup> Of these, sixty-two are endemic to the Himalaya. People in this region are partially or completely dependent on forest resources for medicine, food, and fuel. <sup>[4]</sup> The traditional knowledge system (TKS) on various medicinal plant species is indigenous to different ethnic communities of the Himalaya. <sup>[5,6]</sup> In developing countries like India, the population in rural and remote hilly areas still largely depend on traditional medicine, especially based on plant. The documentation of ethnobotanical knowledge on medicinal plants is important to preserve the ancient knowledge system <sup>[7, 8, 9]</sup> and initiate management action to conserve valuable biological resource <sup>[10]</sup> Documentation of the TKS in remote hilly areas in Indian Himalayan region is still limited <sup>[5, 11]</sup> and local traditional healthcare practices are important to be documented. Keeping this view in mind, the present study was conducted in 9 villages of Joshimath block of Chamoli district with aimed to document the indigenous traditional knowledge and attempt to fill the information gap on ethno-medicinal plants and their respective uses in various diseases and ailments respectively.

### 2. Materials and Methods

The study was carried out in Joshimath block of Garhwal which is located on the outer ranges of the mid Himalayas which comprise low line peaks rising contiguously with the

planes of the northern India. According to Census 2011, the total area of the Joshimath block is 4647 km<sup>2</sup> including 4,663.13 km<sup>2</sup> rural area and 13.50 km<sup>2</sup> urban area at latitude 30° 33' 1.9872" N and longitudes 79° 33' 57.4704" E. The extensive field survey was conducted during the year of 2016 to 2019 regarding the phytosociological analysis within an altitudinal gradient of 1400-2200msl respectively. During the field survey, the specimens (roots, leaves, flowers, seeds) of different plant species were collected. After collection of specimens, the experienced local persons and Vadhya's were investigated from the study area villages and then locally identified the plant specimens with the help of them. At the same time some plants of surrounding were also listed regarding the ethno-medicinal uses with the help of these experienced persons and Vaidyas. During the course of identification and interview, the semi-structural questionnaires were used to obtain information on ethno-medicinal plants with the local name of the plants, name of the particular disease for which a particular plant is used, part of the plant used for particularly disease and so on. The collected plant specimens were brought to the Kumaun University Nainital and identified. Other taxonomic information of plant was verified from the relevant flora of Garhwal Himalaya. <sup>[4]</sup> After compilation of these information, the status of plants were categorized and documented on the basis <sup>[12, 13, 14, 15]</sup> respectively.

### 3. Results and Discussion

On the basis of present investigation, the scientific names of plants, their vernacular names and medicinal uses are presented in Table 1. A total of 57 plant species belonging to 38 families of medicinal plants with their value was recorded. Of the total species, 14 were trees, 13 shrubs, 27 herbs, 2 climbers, and 1 fern. The results are given in the

form of table and graphs. The plant parts used for medical preparation were roots, rhizomes, bark, leaves, flower, seeds, gum, and whole plants. The most frequently utilized plant parts were root, followed by leaves, bark, seed, and whole plants. During the course of field investigation the plants reported from the study area were highly valuable for medicinal uses like diarrhea, dysentery, fever, painful inflammations, coughs, asthma, bronchitis, digestive problems, diabetes, fever, and exhaustion, leucorrhoea, leprosy, piles, stomach complaints, ulcer, arthritis, wound, cholera, liver complaints, body swelling, tumour, malaria, rheumatic pain, skin ailments, swelling, tonic, eye diseases, stroke, and paralysis, in cold and pain of stomach, menstrual disorder, urine complaints, bronchitis, etc. The study provides sufficient ground to believe that the traditional medicinal practice using the native medicinal plant is alive and well functioning in the study area. Similar previous studies in the Himalayan region supports to present study regarding the use of ethno-medicinal plants [5, 6, 7, 16]. But, due to anthropogenic activities some plant resources have been decreasing in the study area, regarding this, the plants were listed under threatened categories such as endangered, critically endangered, vulnerable and rare [4, 12,13, 14, 15]

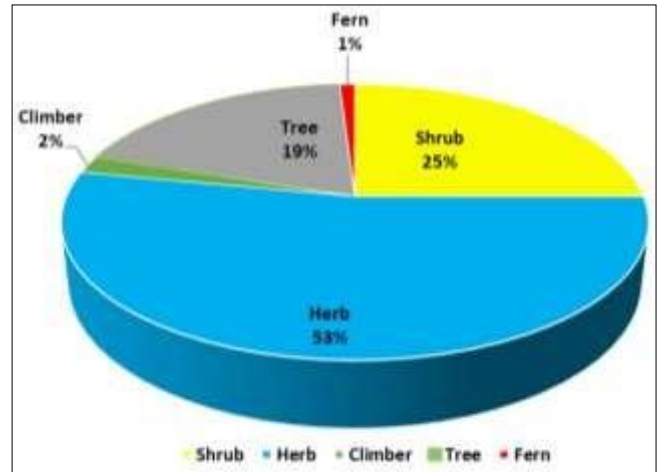


Fig 3: Ethno medicinal plants: Life form diversity.

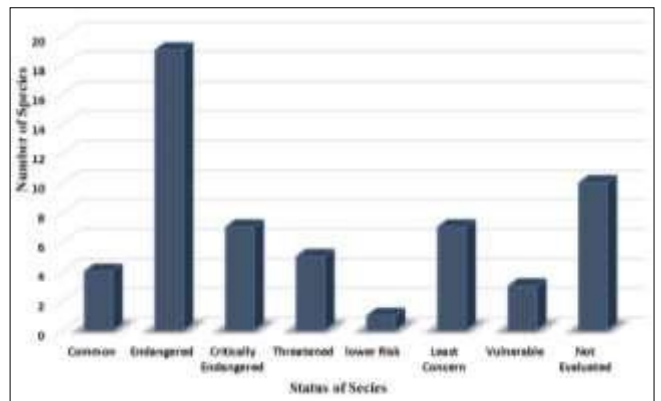


Fig 4: Number of plant species under different IUCN categories

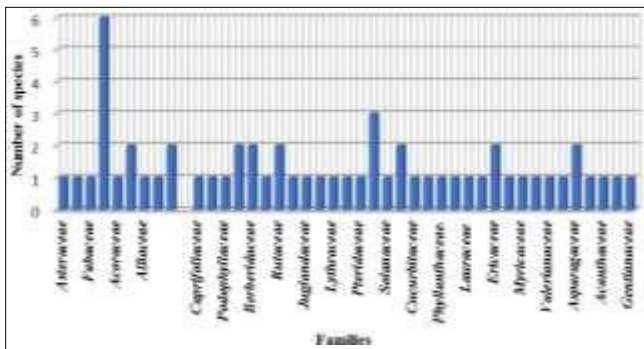


Fig 1: Ethno- medicinal plant belonging to different families

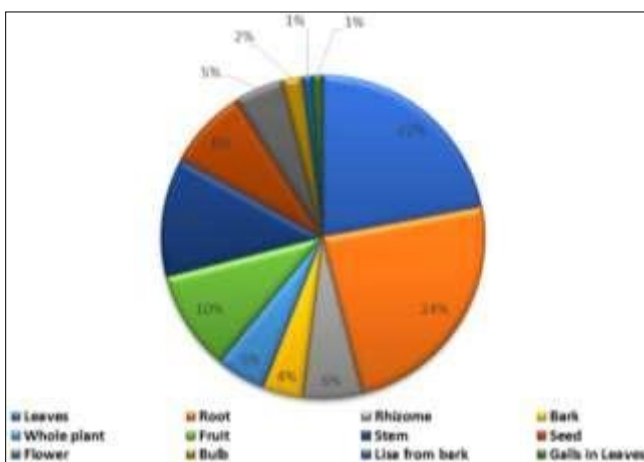


Fig 2: Ethno medicinal plants: Utilization pattern

4. Conclusion

The demand for herbal medicines has put pressure on the medicinal plants at this time, while the modern medical system is at a high level of treatment of various diseases. But these modern medical facilities have not been able to reach tribal and people living far from the urban areas even today. As a result, even today, these people are completely dependent on traditional methods of treatment through ethno-medicine. Most of the rural people of the Himalayan region still depend on ethno- medicine. In the present investigation, it has been observed that most of the Vaidyas possessing traditional knowledge has passed the age of 70 to 75 years. If their traditional Knowledge is not protected in time, then a day will come when this traditional knowledge of the ethno-medicinal plants will end with the death of these people. Therefore, it is necessary that the conservation and propagation of ethno- medicinal plants is necessary while protecting Vaidhyas’s traditional knowledge. So that for a long time, the villagers continue to get the benefit of herbal medicine in a sustainable manner and these species are saved from extinction.

Table 1: Ethno-medicinal plants used by locals in the treatment of different ailments

S. N	Botanical Name	Family	Local Name	Habit at	Part used	Status	Uses
1	<i>Artemisia vulgaris</i> Linn.	Asteraceae	Pati	Shrub	Leaves & Flower	Common	Useful in stomachache, asthma & mental illness. Also works as an antiseptic.
2	<i>Ephedra Gerardiana</i> Wall. ex Stapf.	Ephedraceae	Somlata	Shrub	Aerial part (Young branchlets and	Endangered	Useful in cough, bronchitis, asthma, and arthritis

					stems)		
3	<i>Indigofera pulchella</i> Roxb.	Fabaceae	Sakina	Shrub	Root	Common	Useful in cough & chest pain. The leaves and roots are used for swelling of the stomach.
4	<i>Aconitum heterophyllum</i> Linn.	Ranunculaceae	Atees	Herb	Rhizome, Root, Seed	Critically Endangered	When taken with a fine powder of dry ginger & Nutmeg it is used to treat diarrhea. The juice of the roots is taken with milk to treat cough & fever. The plant is used to treat patients with reproductive disorders.
5	<i>Aconitum lycoctonum</i> Linn.	Ranunculaceae	Murilla	Herb	Root	Common	Juice of roots is used by locals as medicine in stroke and paralysis, in cold and pain of stomach, menstrual disorder.
6	<i>Aconitum atrox</i> (Bruhl)	Ranunculaceae	Meethavish	Herb	Root tubers	Threatened	Root tubers are used to treat painful inflammations, coughs, asthma, bronchitis, digestive problems, diabetes, fever, and exhaustion.
7	<i>Aconitum falconeri</i> Stapf.	Ranunculaceae	Meetha	Herb	Root, leaves & flowers	Endangered	Useful in asthma, gout, cough, skin diseases, fever & joint pain.
8	<i>Acorus calamus</i> . Linn.	Araceae	Vach	Herb	Rhizome	critically endangered	Used medicinally for a wide variety of ailments, such as gastrointestinal diseases, treating pain, dysentery & dyspepsia.
9	<i>Angelica glauca</i> Edgew.	Apiaceae	Gandrayan	Herb	Root	Endangered	The powdered root, combined with milk, is used in the treatment of bronchitis and constipation. The plant is used as a cordial stimulant in the treatment of dyspepsia and constipation.
10	<i>Allium stracheyi</i> Baker.	Alliaceae	Faran	Herb	Leaves, bulb & Flower	Endangered	The leaf and bulb parts of this plant are used locally in the alleviation of inflammation and pain conditions
11	<i>Juniperus communis</i> Linn.	Cupressaceae	Bhidaru	Shrub	Bark, fruits and leaves	Least Concern	Bark and fruits are used in asthma, gonorrhoea, pulmonary blennorrhoea, arthritis, respiratory affections, diabetes, bladder affections, chronic pyelonephritis, cough, abdominal disorders, and skin affections.
12	<i>Delphinium denudatum</i> Wall.	Ranunculaceae	Mevirshe	Herb	Root	critically endangered	The roots of the plant are useful in tooth pain, as an antidote for poison, fungal infection, piles, and toothache as an analgesic and astringent.
13	<i>Dioscorea deltoidea</i> Wall. ex Griseb.	Dioscoreaceae	Kath tarun	Climber	Root	Vulnerable	The juice of the root tuber is taken for treatment of roundworm, asthma, and arthritis.
14	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Gaethi	Herb	Axillary bulbils (Air potato)	Not Evaluated	Air potato has been used as a folk remedy to treat conjunctivitis, diarrhea, and dysentery, among other ailments
15	<i>Nardostachys jatamansi</i> DC.	Caprifoliaceae	Jatamasi	Herb	Root	Endangered	The roots and rhizomes are used to treat mental weakness, including antimicrobial, antifungal skin infections.
16	<i>Picrorhiza kurroa</i> Royle ex Benth	Plantaginaceae	Kutki	Herb	Root, Rhizome	Endangered	Useful in fever & diarrhea. The rhizome is used for the treatment of digestive problems. It is used in all forms of liver problems.
17	<i>Podophyllum hexandrum</i> Royle	Podophyllaceae	Van kakri	Herb	Rhizome	Endangered	Rhizomes are used for typhoid fever, jaundice, dysentery, skin diseases, tumorous growth, kidney & bladder problems.
18	<i>Potentilla fulgens</i> Wall. ex Hook.	Rosaceae	Bajradanti	Herb	Root	Endangered	The aqueous root peel extract of which is consumed to get rid of intestinal parasitic infections; also, the taproot of the plant is traditionally chewed along with betel nut for curing worm infections. is also used for the treatment of diarrhea, stomach ailments, cough and cold, diabetes
19	<i>Berberis chitria</i> Buch.-Ham. ex Lindl.	Berberidaceae	Daru haldi	Shrub	Root	Least Concern	The juice of the bark is used to treat malaria, jaundice, eye problem, diabetes. The root is used orally in the treatment of various enteric infections, especially bacterial dysentery.
20	<i>Bergenia ligulata</i> (Wall.) Engl.	Saxifragaceae	Pashanbed	Shrub	Root	Endangered	The juice of the bark is used to treat

		ae					malaria, jaundice, Used in Diarrhea & stone problem, helpful to treat Dysentery.
21	<i>Centella asiatica</i> (L.) Urban.	Apiaceae	Bhrami	Herb	Whole plant	Least Concern	Used to treat various disorders and minor wounds.
22	<i>Skimmia laureola</i> DC.	Rutaceae	Kastu	Shrub	Leaves & Flower	Critically Endangered	The leaves are used in the treatment of smallpox. The smoke produced by burning them is said to purify the air.
23	<i>Aesculus indica</i> (Wall. ex Cambess.) Hook.	Sapindaceae	Pangar	Tree	Fruit & seed	Not Evaluated	Seeds are used for the treatment of some skin diseases, rheumatism, and in the relief of headaches.
24	<i>Juglans regia</i> Linn.	Juglandaceae	Akhrot	Tree	Leaves & Flower	Common	Leaves are used for the treatment of constipation, chronic coughs, asthma, diarrhea, dyspepsia, etc.
25	<i>Zanthoxylum armatum</i> DC.	Rutaceae	Timur	Tree	Seed	Endangered	They are used as an aromatic tonic in the treatment of fevers, dyspepsia, asthma and cholera. A paste of the seeds is held between the teeth for about 10 minutes to relieve toothache.
26	<i>Taxus baccata</i> Linn.	Taxaceae	Thuner	Tree	Leaves, Flower & Bark	Endangered	Used for the treatment of high fever and painful inflammatory conditions. Its bark is used to treat fractures and headaches.
27	<i>Woodfordia fruticosa</i> (L.) Kurz.	Lythraceae	Dhai, Dhati	Shrub	Flower	Least Concern	It is used to cure diarrhea, piles, dysentery. Flowers are sprinkled over wounds & ulcers for quick healing.
28	<i>Cannabis sativa</i> Linn.	Cannabaceae	Bhang	Shrub	Plant, fruit & seed	Threatened	Used for the control of nausea and vomiting.
29	<i>Adiantum venustum</i> D. Don.,	Pteridaceae	Hansraj	Fern	Fern	Threatened	The fern is used for the treatment of cold, headache, hydrophobia, and inflammation of the chest.
30	<i>Thymus serpyllum</i> Linn.	Lamiaceae	Van ajvain	shrub	Whole plant	Least Concern	Used for weak eye side, stomach problems, toothache.
31	<i>Thalictrum foliolosum</i> DC.	Ranunculaceae	Mamiro	Herb	Root	Not Evaluated	Used for treating dyspepsia, peptic ulcers, indigestion, fevers & toothache.
32	<i>Datura stramonium</i> Linn.	Solanaceae	Dhatura	Herb	Leaves & Flower	Endangered	Used for treating asthma, toothache & paste of its leaves are also used as an anti-inflammatory gel..
33	<i>Mentha sylvestris</i> Linn.	Lamiaceae.	Podina	Herb	Leaves & Flower	Endangered	Used in stomachache and gastric problems.
34	<i>Lilium polyphyllum</i> D. Don ex Royle.	Liliaceae	Sher	Herb	Root, bulb	Critically Endangered	Bulbs are useful in cough, bronchitis, seminal weakness & burnings sensation.
35	<i>Citrullus colocynthis</i> Linn.	Cucurbitaceae	Indrayen	Climber	Fruit & seed	Not evaluated	Used for insect bites to treat skin eruptions.
36	<i>Hedychium spicatum</i> (Ham-ex-Smith).	Zingiberaceae	Kapoor kachri	Herb	Root	Vulnerable	It is useful in asthma, bronchitis, vomiting, dyspepsia, and inflammations.
37	<i>Emblica officinalis</i> Gaertn.	Phyllanthaceae.	Anwala	Tree	Fruit & seed	Endangered	Useful for pregnant women's for increasing hemoglobin and in neutralizing snake venom.
38	<i>Diploknema butyracea</i> (Roxb.) H. J. Lam.	Sapotaceae	Chura	Tree	Fruit & seed	Vulnerable	Fruits & seeds are used to make an ointment, often perfumed with cloves or rose oil, to relieve rheumatic pains.
39	<i>Prunus cerasoides</i> D. Don.	Rosaceae	Padam	Tree	Stem, bark, seeds, fruits	Least concern	Fruits are used in bleeding disorders such as nasal bleeding & heavy periods. Stem & bark are used in vomiting and skin disorders.
40	<i>Cinnamomum tamala</i> Nees and Eberm.	Lauraceae	Tezpat	Tree	leaves	Low Risk	Useful in skin diseases and diabetes.
41	<i>Viburnum cotinifolium</i> D. Don.	Viburnaceae	Ghueya	shrub	chaal	Not evaluated	Useful in abdominal pain.
42	<i>Rhododendron arboreum</i> Smith.	Ericaceae	Buransh	Tree	Leaves, Flower, Bark	Endangered	Leaves are made into a paste and then applied to the forehead in the treatment of headaches. The juice of the bark is used in the treatment of coughs, diarrhea, and dysentery. The juice of the flowers is used in the treatment of menstrual disorders. The petals are eaten to assist the removal of any animal bones that have become stuck in the throat.
43	<i>Syzygium cumini</i> Linn.	Myrtaceae	Jamun	Tree	Bark, fruit, seed	Not evaluated	The juice of the ripe fruit is given in chronic diarrhea and urine retention.

							Water-diluted juice is used as a gargle for sore throat and as a lotion for ringworm of the scalp.
44	<i>Lyonia ovalifolia</i> (Wall.) Drude.	<i>Ericaceae</i>	Ayaar	Tree	Leaves	Not evaluated	The young leaves and buds are used externally as an infusion to treat skin diseases and external parasites.
45	<i>Myrica esculenta</i> Buch-Ham.	<i>Myricaceae</i>	Kafal	Tree	Bark, fruit, seed	Endangered	It is widely used to treat several ailments such as asthma, cough, chronic bronchitis, ulcers, inflammation, anemia, fever, diarrhea, and ear, nose, and throat disorders.
46	<i>Pinus roxburghii</i> Sarg.	<i>Pinaceae</i>	Cheer	Tree	Lisa from bark	Least concern	Used in treating diseases of the eyes, ears, throat, blood, and skin, bronchitis, ulcer & inflammations.
47	<i>Valeriana jatamansi</i> Jones.	<i>Valerianaceae</i>	Sugandhballa	Herb	Root	Critically endangered	Rhizomes and roots are used as a hepatic and nerve tonic. They are also useful skin diseases.
48	<i>Pistacia chinensis</i> Bunge.	<i>Anacardiaceae</i>	Kakarsingi	Tree	leaves, Galls	Not evaluated	Galls, produced on the tree in response to attacks by insects, are used in the treatment of coughs, phthisis, asthma, dysentery, etc.
49	<i>Berberis asiatica</i> Roxb. ex DC.	<i>Berberidaceae</i>	Kilmora	shrub	root, bark	Not evaluated	The roots are used in treating ulcers, urethral discharges, jaundice & fevers.
50	<i>Fritillaria roylei</i> HooK.	<i>Liliaceae</i>	Kakoli	Herb	Bulbs & Roots	Endangered	Bronchitis, burns, stomach troubles. The roots are used for healing wounds & corns.
51	<i>Polygonatum verticillatum</i> Linn.	<i>Asparagaceae</i>	Maida	Herb	root	Vulnerable	Roots are crushed and its juice is used for boosting immunity.
52	<i>Polygonatum cirrhifolium</i> (Wall.) Royle.	<i>Asparagaceae</i>	Mahamida	Herb	root, leaves	Threatened	The bulbs are used in the treatment of asthma. Juice of roots & leaves are used for curing pain in the kidneys, pain in the hips, Swelling, Fullness in the abdominal region, Bone joints, Skin eruptions & Cough.
53	<i>Didymocarpus pedicellata</i> R. Br.	<i>Gesneriaceae</i>	Pathar laung	Herb	Small leaves	Threatened	Used for treating kidney stones.
54	<i>Adhatoda vasica</i> Nees.	<i>Acanthaceae</i>	Arusa	shrub	Leaves	Endangered	Leaves are used to help with cough and other symptoms of colds.
55	<i>Chenopodium borbasii</i> Murr.	<i>Amaranthaceae</i>	Bathuva	Herb	Leaves	Not Evaluated	Leaves of the plant are used in the treatment of digestive, peptic ulcer, and hepatic disorder.
56	<i>Coleus forskohlii</i> Briq	<i>Lamiaceae</i>	Banderjadi	Herb	Root	Endangered	Roots are used to treat heart disorders such as high blood pressure and chest pain, as well as respiratory disorders such as asthma.
57	<i>Swertia chirata</i> Buch.-Ham. Ex Wall.	<i>Gentianaceae</i>	Chirauta	Herb	Whole Plant	Endangered	It is used to treat numerous ailments such as liver disorders, malaria, and diabetes

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