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HIMALAYAN MEDICINAL PLANTS WEALTH, THREATS AND CONSERVATION FOR SECURING THE FUTURE OF BIODIVERSITY

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Abstract

The Himalayas are a rich reservoir of medicinal plants, which span across eight countries and cover 18% of the Indian subcontinent, with approximately 1,748 species utilized for medicinal purposes. However, these resources are jeopardized by excessive harvesting and climate change. This is the first comprehensive analysis of the Himalayan plants in order to demonstrate the traditional features of the Himalayan flora up to this point, the data on the medicinal flora was categorized. The family names were recorded alongside the number of plants. The species' habits, the components used, and the application technique were observed. The diseases cured by the medicinal flora were categorized into 12 types. A total of 150 species of medicinal plants representing 68 families were recorded. The plant family Asteraceae, comprising of 21 species, was found to be the most often indicated, followed by Lamiaceae, which had 9 species. The components most often used were the leaves and roots. Paste (75 Plants) and powder (69 plants) were the most often utilized preparations for these medicinal plants. The current analysis reveals substantial variation in the preparation methods of medical medicines among the plant species. 126 plant species were utilized for treating dermatological conditions, and 120 species were found to be effective against gastrointestinal conditions. This study underlines the importance of these medicinal plants for tackling global efforts to protect biodiversity to ensure the future of upcoming generation through conservation efforts essential to the continued use of these invaluable resources.

Key words: Medicinal plants, Himalaya, Diversity, Conservation.

Introduction

The Himalayas is spread across eight countries including: Pakistan, Nepal, Myanmar, India, China, Bhutan, Bangladesh, and Afghanistan. These countries are renowned for their remarkable biodiversity and the abundance of useful medicinal plants. Encompassing 18% of the Indian subcontinent, the Himalayas are home to approximately 8,000 species of angiosperms, with 1,748 species utilized for medicinal purposes (Kala, 2005). The Himalayas form a vast arc that spans over 2500 km from west to east. The Himalayas are often divided into three regions: the central, eastern and the western Himalayas. The western Himalayas are amongst India's most established and widely recognized phytogeographic areas. Hooker's (1875-1897) book Sketch of the Flora of British India established the western Himalayan as a botanical zone, which spans from Kumaun to Chitral. Kumaun comprises six districts throughout Uttarakhand's hills: Alomra, Bageshwar, Champawat, Nainital, Pithoragarh, and US Nagar. Almora district is in Uttarakhand's Kumaun region of India.

Asia has many medicinal plant species in the Himalayan Mountain range, which are essential to rural livelihoods because they provide a variety of valued goods for food and medicine due to its unique topographical, physiographical, geographical, biological, and climatic conditions (Britto *et al*., 2005). Globally, around 70 per cent of people rely on medicinal plants to cure a variety of medical conditions, including viral disorders. Herbal medicines are being very commonly used due to their low costs, simplicity of adaptation, and reduced risk of adverse patient reactions (Joshi *et al*., 2010). The Kashmir Himalayan valley is home to a wide variety of flora. William Moorcroft (1822) was the first person to document floristic research in Kashmir. Vigne, von Huegel, Royle, and Victor Jacquemont were amongst the other Western explorers. Royle published taxonomic diagnoses and illustrations of various Kashmiri florae. J. D. Hooker includes in his Flora of British India (1872–1897) plant material from this region that included a wide variety of taxa. Following this, three botanists-Coventry, Blatter, and Stewart-contributed significantly to Kashmir's flora (Dar, 2008), (Kumari *et al*., 2018), (Myers *et al.*, 2000), (Kala and Manjrekar, 1999). The Indian Himalayan Region (IHR) is home to important ancestral populations, including the Baiga tribe, Bhoksa, Bhotias, Chenchu people, Gurjar, Jarawas, Jaunsaries, Kharvar, Mahigiri, Shaukas and the Tharus. These people utilize medicinal herbs as a natural way of treating diseases (Joshi *et al.*, 2016), (Kumari *et al*., 2018).

The Himalayan region is recognized as the world's center for biodiversity, in which ecological, evolutionary and phytogeographical variables favor a high species diversity. It is a source of several medicinal and aromatic plants (MAPs). Though making up only 18% of the land area of India, the Himalayan region is home to over 30% of the endemic species that are found throughout the Indian subcontinent. In this area alone, there are over 18,440 plant species, of which 45% have the potential to be used medicinally (Maikhuri *et al*., 1998). The trans-Himalayan regions of India are well known for having poorly distributed vegetation and a low diversity of species. They cover an area of more than 186,000 km^2 above the natural zone of the tree line. This zone is home to over a thousand different plant types, 225 different kinds of birds, and several rare and endangered animal species, such as the snow leopard (Fox, 1994; Kala and Manjrekar, 1999). Bio-active secondary metabolites are thought to be responsible for the therapeutic effects of herbal medicine (Croteau *et al*., 2000). Naturally occurring medicinal plants have been increasingly popular as a component for pharmaceuticals and conventional healthcare systems throughout the last 20 years. Medicinal plants are considered a source of more than 85% of the herbal remedies utilized in traditional healthcare systems (Bhattacharya *et al*., 2008; Phondani *et al*., 2014). In many developing countries, such as Nepal (75%), India (80%), Myanmar (85%) and Bangladesh (90%) most of the population are living in rural areas. According to WHO estimates, India accounts for $1 billion in the global herbal medicine market annually (Joshi *et al*., 2004) and US $14 billion annually worldwide (Sharma *et al*., 2010). Communities of the Sikkim Himalaya region utilize about 550 medicinal plants to treat many illnesses however, only a small number are used commercially. (Nepal *et al*., 2024). The medicinal plants found in the Himalayas account for a large percentage of the non-timber forest products (NTFPs) (Ghimire *et al*., 2005). Nowadays; most of the medicinal plants found in the Himalayan are a part of subalpine and alpine regions (Singh and Dey, 2005). Many of these plant-derived medications were first found through research into indigenous peoples' folklore and traditional remedies; some of these couldn't be replaced despite significant advancements within the field of synthetic chemicals (Kumar *et al*., 2011).

Many of the remote Himalayan valleys have not been well documented for their medicinal plant applications, even though the local indigenous population has a long-established system of health care and cure utilizing the accessible medicinal plants. The effectiveness of medicinal plants is increased by the elderly since they have more precise information about the components and recipes than the younger generation. Other ethnobotanists in the Hindu Kush region and Southern Ethiopia have documented a similar trend (Jan *et al*., 2017). It is critical to understand that one of the primary factors contributing to the loss in plant populations is the unsustainable harvesting of medicinal herbs. The other factors are the growing human population, excessive grazing, habitat destruction, multipurpose collection, and negligence (Suzuki *et al*., 2014). This kind of scenario is more likely to occur in the Himalayan region, which is warming more quickly than the rest of the world and has a vast attitudinal range, a variety of ecosystem types, changing climatic zones, slopes, and soil nutrient availability (Liu and Chen, 2000). Nevertheless, environmental stressors are reducing their availability in the natural world, which is lowering the quality of bioactive chemicals and impacting their application in both conventional and contemporary medical systems. Plant morpho-physiological, biochemical, and molecular traits are said to be altered by these stresses (Pandey and Shukla, 2015), which also reduce medicinal plant yield (Yang *et al*., 2013; Jayasinghe *et al*., 2017) and put biodiversity at risk (Kumar and Clark, 2012; Negi *et al*., 2012). This is the first comprehensive analysis of the Himalayan plants in order to demonstrate the traditional features of the Himalayan flora for a sustainable future.

Methodology: This is the first extensive study regarding the traditional uses of the flora of Himalayas. The available published literature was downloaded from various search engines such as Google Scholar, PubMed, Science Direct, etc. The habit of different plants, ability to cure diseases, plant part used, method of use, their ethnobotanic features, tradition uses, major threats and many other features were critically reviewed, and the important information was abstracted. The data on the medicinal flora was categorized to demonstrate the traditional aspects of the Flora of Himalayan to date. The family names with the number of plants were observed. The habit of the species (herb, shrub, tree, climber), parts used (root, stem, rhizome, leaves, stems, flowers, fruit, seed, bark, entire plant), method of use (powder, decoction, ripe fruit, paste, juice) were noted. The diseases cured by the medicinal flora were categorized into 12 types. These include gastrointestinal disease, circulatory disease, respiratory disease, and others. Within each disease type the ailments were also separated. The number of plants for each disease type was also counted. The Ethnomedicinal inventory provided the information under the categories scientific name, family, elevation, habit, ailment, parts used, method of use, conservation status, major chemical constituents, and references.

Results and Discussions

The findings of this study underscore the extensive and intricate use of Himalayan Medicinal Plants, revealing a rich tradition of utilizing nature's resources for medicinal purposes. The wide range of plant species and the consumption of various plant parts are indicators of the Himalayan region's deeply ingrained customs and traditional knowledge.

Himalayan medicinal plants have been assessed for a wide range of ailments, which highlights their importance from a cultural, medical, and economic aspect. In addition to conservation efforts to ensure the long-term usage of these resources, it is essential to treat common illnesses and investigate unexplored possibilities for treating fewer common ailments. There are many native and herbal medicinal plants in the Himalayan region (Dhar *et al*., 2002). Plenty of individuals in rural Uttarakhand rely significantly on medicinal plants as a source of income; they contribute between 17–35% of the household income (Chauhan, 2010). Several remedies are widely used globally. For example, kidney stones can be relieved by *Bergenia ciliata* and skin disorders can be treated using *Rubia manjith* in Far West Nepal (Kunwar *et al*., 2009). In Himachal Pradesh, *Berberis asiatica* is used to treat diabetes, and *Viola canescens* is used to treat common colds (Uniyal *et al*., 2006).

Pakistan is known for possessing over 600 species of medicinal plants, of which approximately 300 can be found in the Lesser Himalayas, as reported by (Shinwari, 2010). *Ajuga bracteosa* is prescribed for jaundice, *Viola canescens* for the common cold, *Juglans regia* is utilized for toothaches, and *Taraxacum officinale* is used for liver problems in Pakistan (Ali *et al*., 2011). *Aegle marmelos* is consumed for digestive problems (Dhuley, 2003). *Cedrus deodara* is utilized for dysentery (Kumar *et al*., 2011), *Centella asiatica* is used for skin diseases (Brinkhaus *et al*., 2000); *Cinnamomum tamala* is consumed for cough and cold (Thamizhselvam *et al*., 2012) and *Solanum nigrum* is used for liver tonic (Hsieh *et al*., 2008).

Ajuga bracteosa, with its anti-inflammatory, antifungal, antibacterial, and anthelmintic qualities, has been used as a medicine since ancient times (Israili and Lyoussi, 2009). Chemical components present in the seeds of *Azadirachta indica* contains limonoids (azadirachtin) and insecticidal triterpenoids (azadiradione) (Devi and Sharma, 2023). The sesquiterpene and artemisinin chemical compounds were found active in *Artemisia annua* species (Konovalov and Khamilonov, 2016).

The constant decline and eventual extinction of traditional knowledge in the Himalayas due to generational gaps makes the global situation of medicinal plants very concerning (Prakash, 2015). The locals of villages have given up a great deal of indigenous knowledge since written communication replaced oral communication as the main form of communication. As a result, it has become more difficult for the elder generation to share their knowledge with the younger generation (Jabeen *et al*., 2009).

Human activities include overharvesting medicinal plants, expanding agricultural land, overgrazing, gathering fuel wood and fodder, and igniting forest fires are major dangers to medicinal plants (Abbasi *et al*., 2013). Overexploitation for domestic use is one of the main threats to the native populations of indigenous medicinal plants in the Western Himalayas. *Aconitum heterophyllum* is one of the species in the highest threat category, according to reports from other Himalayan regions, and its conservation is urgently required (Pandey *et al*., 2019). The threatened plant species are a result of local people collecting either the entire plant or specific parts. The main reason Himalaya's economically significant medicinal plants are disappearing is excessive and uncontrolled exploitation (Tali *et al*., 2019). In Kashmir, Himalaya, decades of excessive harvesting of medicinal plants have led to the extinction of numerous taxa. Overexploitation is causing the medicinal flora of the Kashmir Himalaya to decline at an alarming rate (Ganie *et al*., 2019). According to the IUCN (2008), one of the significant threats to India's medicinal plants is overexploitation. It is also estimated that overexploitation of medicinal plants has resulted in about 15,000 species at risk of extinction globally (IUCN, 2007). Several commercially valuable wild medicinal plant species are seriously threatened by overexploitation by humans for local use, endangering their habitats. All these plant species are being depleted, whether legally or illegally, in the wild for local use and sale in regional, national, or worldwide markets due to their significance as medicines. The primary threat to these plant species is the over-extraction of different herbs (e.g., *Aconitum heterophyllum, Picrorhiza kurrooa*) by locals for medical purposes and export to other regions for local use (Ganie *et al*., 2019).

Large-scale dispersion of habitat is a result of landslides, which also have an impact on the natural population. One of the main factors putting medicinal plant species at risk is landslides. Landslides alter the physicochemical characteristics of the soil and cause a rise in other ruderal species that have a competitive advantage over endemic species. This could ultimately result in the extinction of endemic species by creating unfavorable conditions in their natural habitat (Tali *et al*., 2019). There has been a decline in numerous highly valuable medicinal plants due to the ongoing removal of several medicinal plant species from their natural habitats and the significant loss of those habitats over the past few decades. The continuous rate of landslides may result in the natural habitats of various medicinal plants in the area being degraded (Tali *et al*., 2016).

Most medicinal plants that are used to make herbal remedies and nutraceuticals are harvested in the wild. The massive amount of plant materials extracted from the few plant populations present in natural habitats is an intolerable situation, especially as traditional healthcare systems gain popularity (Dwivedi *et al*., 2019). The percentage of reports of medical plant use grew gradually with height and the richness of medicinal plants declined with altitude. Locals from higher altitude regions tend to choose medicinal herbs as a remedy (Kunwar *et al*., 2016). Asteraceae is considered a very dominant family in the region of Western Himalaya (Hamid and Raina, 2014; Asif *et al.*, 2021). Many plants are used for their medicinal properties in the Northwestern Himalayas (Haq and Singh, 2020). Locals believe it is sustainable and safe to utilize leaves for medicinal uses (Jan *et al*., 2020). A high concentration of bioactive compounds is found in most medicinal roots, also local population prefers to use roots as a medicinal remedy (Pandey *et al*., 2019). Overharvesting of endangered medicinal plants should be avoided because it puts the plant at even more risk of becoming extinct (Rathore *et al*., 2020).

In the present study 30 trees, 86 herbs, 26 shrubs, and 8 climbers were among the 150 plant species which were abstracted via review on the Himalayan Medicinal Plants as mentioned in Table 1. Herbs makes up about 58%, Trees about 20%, Shrubs about 17% and Climbers about 5% of the total 150 medicinal plants (Fig. 1). Every plant has special medical qualities and uses different portions for different reasons. Roots of 44 species were found to be used, leaves of 50, complete plant 38, and a variety of other parts such rhizomes, stems, flowers, seeds, fruit, and bark as seen in Table 1. The highest percentage of plant part used was leaves at 23% and the lowest were stems at 2% as shown in Fig. 2. (Samant and Mohinder Pal, 2003) discovered 701 kinds of medicinal plants from different forest types of Uttarakhand, 138 of which were trees, 135 of which were shrubs, and 421 of whom were herbs. (Bhat *et al*., 2013) 12 genera and 61 families comprise the 152 species of medicinal plants that have been documented from the Kedarnath Wildlife Sanctuary. In the Himachal Pradesh Renuka Wildlife Sanctuary, 228 species having aromatic and therapeutic properties were found (Subramani *et al*., 2007).

Table 1. Number of Habitat, Parts used and methods of use by Medicinal Plants found in Himalayas.

Habit	No. of plants	Parts used	No. of plants	Method of use	No. of plants
Tree	30	Root	44	Powder	69
Shrub	26	Rhizome	12	Decoction	56
Herb	86	Stem	4	Ripe fruit	9
Climbers	8	Leaves	50	Paste	75
		Seeds	8	Juice	59
		Flowers	11		
		Fruit	29		
		Entire plant	38		
		Bark	20		

Table 2. Families of the selected medicinal plants found in Himalayas.

Family	No. of plants	Family	No. of plants	Family	No. of plants
Aceraceae	1	Rhamnaceae	1	Hypericaceae	1
Acoraceae	1	Rosaceae	9	Juglandaceae	2
Adiantaceae	2	Rubiaceae	2	Lamiaceae	9
Amaranthaceae	1	Rutaceae	2	Lauraceae	2
Amaryllidaceae	1	Sapindaceae	2	Liliaceae	2
Anacardiaceae	2	Saxifragaceae	2	Linaceae	1
Apiaceae	7	Scrophulariaceae	1	Lythraceae	1
Araceae	1	Smilacaceae	1	Malvaceae	2
Asparagaceae	1	Solanaceae	3	Melanthiaceae	1
Asteraceae	21	Taxaceae	1	Moraceae	2
Berberidaceae	5	Urticaceae	1	Myricaceae	2
Betulaceae	1	Valerianaceae	1	Myrtaceae	1
Bombacaceae	1	Violaceae	1	Orchidaceae	2
Boraginaceae	2	Zingiberaceae	1	Oxalidaceae	1
Brassicaceae	3	Chenopodiaceae	1	Paeoniaceae	1
Buxaceae	1	Comberataceae	1	Papavaraceae	1
Campanulaceae	1	Convolvulaceae	1	Pinaceae	3
Cannabaceae	2	Cucurbitaceae	1	Piperaceae	1
Caprifoliaceae	3	Cuscutaceae	1	Poaceae	1
Caryophyllaceae	1	Dioscoreaceae	2	Polygonaceae	4
Euphorbiaceae	3	Dipsacaceae	1	Ranunculaceae	5
Fabaceae	1	Equisetaceae	1	Geraniaceae	1
Fagaceae	2	Ericaceae	3		

Table 3. Diseases and the Aliments reported in Himalayas.

S. N.O.	Diseases	Aliments
1.	Gastrointestinal	Abdominal pain, Constipation, Diarrhoea, Digestive diseases, Dysentery, Gastrointestinal problems, Haemorrhoids, Indigestion, Intestinal worm, Stomachache, and Vomiting
2.	Circulatory diseases	Blood ailments, Cardiovascular problems, and Heart conditions
3.	Skeleto-muscular system problems	Arthritis, Bone fracture, Joint pain, and Rheumatic diseases
4.	Respiratory systems diseases	Asthama, Cold, Cough, and Respiratory disorders
5.	Dermatological diseases	Body pain, Boils, Burns, Cuts, Scurvy, Skin diseases, and Wounds
6.	Diabetes	Diabetes
7.	Ear, Eye, and mouth disorders	Earache, Eye diseases, Mouth blister, and Toothache
8.	Other ailments	Epilepsy, Metabolic conditions, Ulcer, and Hair fall
9.	Fever	Fever, Malarial fever, and Headache
10.	Gento-urinary ailments	Genitourinary disorders, Gonorrhea, Gynecological problems, Kidney pain, Menstrual complaints, and Urinary disorders
11.	Liver problems	Jaundice and Liver diseases
12.	Poisoning	Insect bite and Snake bite

(Radha *et al.*, 2013)) presented comprehensive information on the floristic diversity of the Alaknanda Valley, including 526 plant species divided into 372 genera and 94 families. From Govind Pashu Vihar WLS, 821 species and 8 subspecies of angiosperms were identified, scattered throughout 479 genera and 125 families (Manikandan and Srivastava, 2015). As the altitude increased, the species composition of trees, shrubs, and herbs changed and showed a decline in both species and family richness. Numerous common species can be found in the montane zone, including weeds of low elevations and plains and invasive alien species that have adapted well to the region's diverse environmental conditions (Rawat *et al*., 2020). According to (Rawat *et al*., 2021) findings, The western Ramaganga valley is inhabited by 651 species of higher plants, out of which 85% are dicotyledons, 12.2% are monocotyledons, and 2.3% are

gymnosperms. (Arora and Daverey, 2018) recorded 125 woody plant species, comprising 72 angiosperms and 53 gymnosperms, derived from Uttarakhand, and were organized into 81 genera and 48 families.

In our research, a total of 150 plants belonging to 68 families were counted. Asteraceae was noted with the maximum number of medicinal plants followed by Rosaceae and Lamiaceae. Numerous parts such as root, stem, rhizome, leaves, stems, flowers, fruit, seed, bark, and entire plant were medicinally used. Leaves and roots were the highly utilized parts. From the review data, the highly used method of these medicinal plants was paste 28% and powder 26% as shown in Fig. 3. The method of preparing the medicinal remedies in the current review varied significantly across the plant species. The most common methods included the use of pastes (75 plants), powder (69 plants), juices (59 plants), and decoctions (56 plants) as shown in Table 1. Additionally, ripe fruit and barks were utilized in 9 and 20 species, respectively, showcasing the diverse approaches to harnessing the medicinal properties of these plants. Upon further analysis, it was observed that the Asteraceae family exhibited the highest prevalence, comprising 21 species, followed by the Lamiaceae family with 9 species. This indicates the dominance of certain botanical lineages in the region's traditional pharmacopoeia (Table 2).

The 12 categories of the diseases were gastrointestinal, circulatory, musculoskeletal system, respiratory system, dermatological, diabetes, ear, eye and mouth, fever, urinary, liver problems, poisoning, and other diseases shown in Tables 3 & 4. The highest percentage of plants (24%) were utilized for dermatological ailments which included body pain, boils, burns, cuts, scurvy, skin diseases, and wounds as shown in Fig. 4. Twenty-three percent species were reported to have effectiveness against gastrointestinal ailments abdominal pain, constipation, diarrhea, digestive diseases, dysentery, gastrointestinal problems, hemorrhoids, indigestion, intestinal worms, stomachache, and vomiting. Twelve percent of plants were used by local communities of Himalayas for respiratory ailments such as asthma, cold, cough, and other respiratory disorders. For the treatment of fever, 11% medicinal plants were employed traditionally. The accumulative percentage of medicinal species for the ear, eye, and mouth was 7%, treating ailments such as earache, eye diseases, mouth blisters, and toothache. Different musculoskeletal diseases like arthritis, bone fracture, joint pain, and rheumatic diseases were cured by 6% local medicinal plants the collective percentages of these diseases. This research indicates that the aliments for gastrointestinal and dermatological problems are widely used by the local population. On the other hand, conditions like diabetes, heart problems, and poisoning have a lower frequency, suggesting either a lower incidence in the region or a relatively limited number of plants which are useful in treating those specific conditions. The distribution of plant use by illness categories illustrates that significant focus is given to treating common ailments like gastrointestinal and dermatological problems. Table 5 contain detailed information regarding the name of the medicinal plants, their aliments, the plant part used, the method of use, conservation status of these plants, threats to the plants, major chemical constituents that make up that medicinal plant and the references.

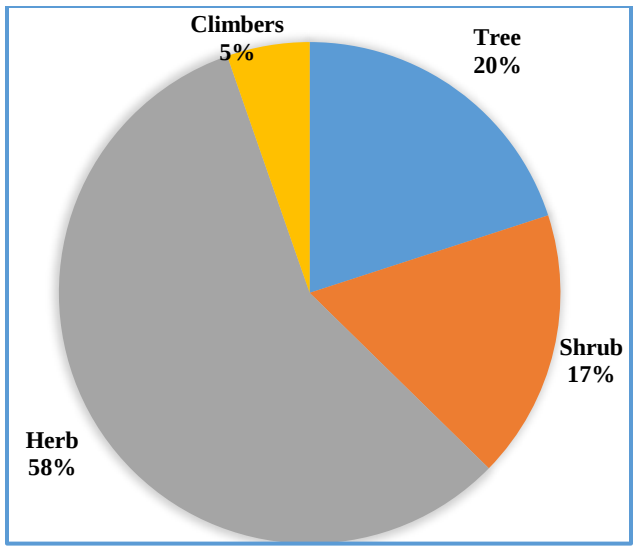

Fig. 1. Pie chart showing the percentage of plants Habits.

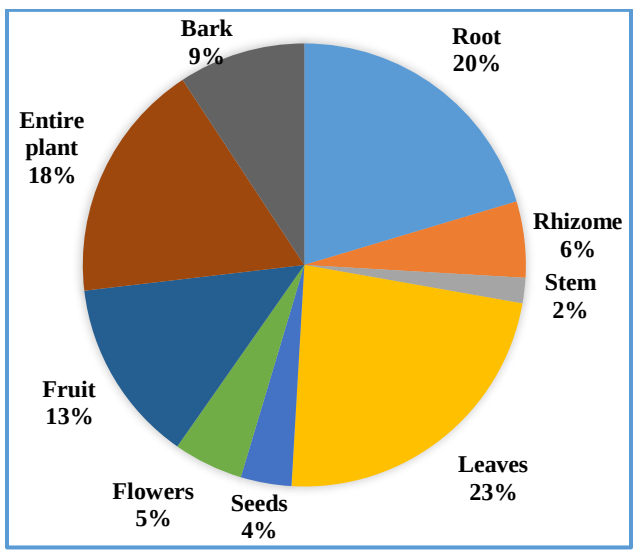

Fig. 2. Pie chart showing the percentage of plant parts used for the treatment.

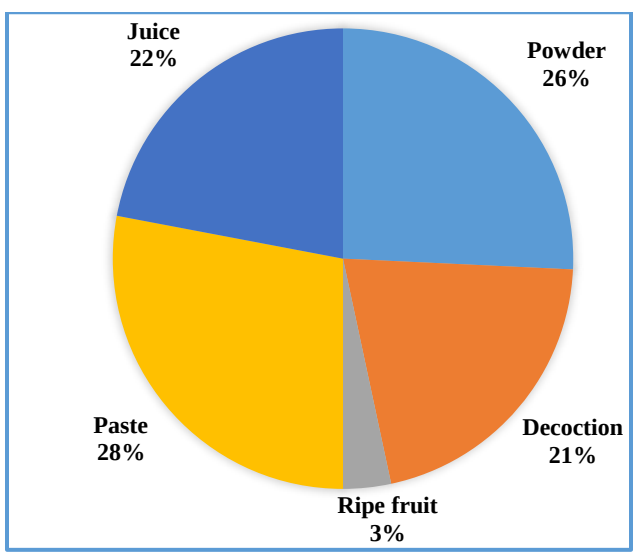

Fig. 3. Pie chart showing the percentage of method of use of the plant parts.

Table 5. Detailed inventory of Himalayan medicinal plants Wealth with Conservation status.

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
1.	*Abies pindrow* Royle (Pinaceae) 2200-2600m Tree	Cough, cold and fever	Bark	Juice Paste Decoction	Endangered	Invasive species	Bioflavonoids, Chalcone glycoside, Flavonoids, Glucopyranoside, Hydroxyl-flavanone, Pentacyclic triterpenoids, Phenolic compounds, Pindrolactone and Pinitol.	(Gupta *et al*., 2011) (Vikram, 2014) (Kumar and Kumar, 2015)
2.	*Acer oblongum* Wall. ex-DC. (Aceraceae) Tree	Contraceptive	Leaves	Decoction	Least concern	Deforestation Climate change Invasive species	-	(Pande *et al*., 2006) (Negi & Rawal, 2019)
3.	*Achillea millefolium* L. (Asteraceae) 1500–3600m Herb	Cold, diarrhoea, dysentery, fever, kidney disease, snake bite, stomach disorder and toothache.	Entire plant	Decoction Paste	Vulnerable	Overharvesting for local use Construction activities in natural areas Local use for fodder	1,8-Gineole, Acetate, Achilleine, Achilloic acid, Glycosides, Terpinine-4-ol, Triterpenes, α−Pinene and β−Pinene.	(Atta and El-Sooud, 2004) (Lakshimi *et al*., 2011)
4.	*Achyranthes aspera* Linn (Amaranthaceae) 1600-1900m Herb	Boils, bronchitis, dysentery, fever, skin diseases, snake bite and toothache	Entire plant	Decoction Juice Paste	Least concern	-	3-Pyrrolidinecarboxylic acid, Alkaloids, Flavonoids, Tannins and Terpenoids.	(Tiwari *et al*., 2010) (Bhosale *et al*., 2012) (Radha *et al*., 2013) (Vikram, 2014) (Husain & Kumar, 2015)
5.	*Aconitum heterophyllum* Wall. ex-Royle (Ranunculaceae) 2000-3700m Herb	Abdominal pain, cough, dysentery, and fever.	Roots and rhizome	Powder Paste	Critically endangered	Excessive grazing by livestock Landslides Exploitation for local use Illicit trade	Aconitic acid, Aconitine, Alkaloids including astine, Atidine, Glycerides (Oleic, Palmitic and Stearic acids), Heteratisine, Heterophylline, Heterophyllistine, Hetidi, Hypaconitine, Indacotinine, Mesaconitine and Tannic acid.	(Sharma *et al*., 2010) (Tiwari *et al*., 2010) (Singh & Rawat, 2011) (Bhat *et al*., 2013) (Jaiswal *et al*., 2013)
6.	*Aconitum violaceum* Jacq. ex-Stapf (Ranunculaceae) 2000-3500m Herb	Cold, cough, fever, stomach problems and toothache	Flower and roots	Powder Decoction	Vulnerable	-	Aconine, Aconitic, Aconitine, Benzoic acid, Indacotinine, Resins, Sparteine and Tannins.	(Rana *et al*., 2010)
7.	*Acorus calamus* L. (Acoraceae) 1000-2000m Herb	Cardiovascular problems, gastrointestinal problems, respiratory disorders, worms, and wounds	Rhizome	Decoction Powder Juice	Endangered	Construction activities in natural areas Overexploitation for local use Overexploitation for fodder	Acoragermacrone, Acorenone, Acorone, Calamusenone, Camphene, Camphor, Isohyobunones, Linalool, Terpinen-4-ol, α-Asarone, α-Calacorene, α-Selinene, and β-Gurjunene.	(Mukherjee *et al*., 2007) (Hou and Jin, 2012)
8.	*Adiantum capillus-veneris* L. (Adiantaceae) Herb	Bronchitis, cough, eye diseases, fever, hair fall, menstrual complaint, and mouth blister	Entire plant	Powder Paste Juice	Least concern	Landslide Excessive harvesting	-	(Pande *et al*., 2006) (Dehdari & Hajimehdipoor, 2018)
9.	*Adiantum venustum* D. Don. (Adiantaceae) Herb	Cough and fever	Entire plant	Juice	Least concern	-	Flavonoids, Saponins, Tannins and Terpenoids.	(Pande *et al*., 2006) (Sofi Mubashir & Shah, 2011)
10.	*Aegle marmelos* (L.) Correa (Rutaceae) 600-1200m Tree	Digestive problems	Leaves and fruit	Decoction Ripe fruit	Least concern	Excessive harvesting Invasive species	-	(Dhuley, 2003) (Mathur & Joshi, 2013) (Anand & Deborah, 2016)
11.	*Aesculus indica* (Wall. ex Cambess.) Hook. (Sapindaceae) 1500-2500m Tree	Rheumatism	Bark, fruit and seeds	Paste	Vulnerable	Climate change Deforestation Invasive species Overexploitation	-	(Rajasekaran & Joginder, 2009) (Radha *et al*., 2013) (Khan *et al*., 2014)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
12.	*Ageratum conyzoides* L. (Asteraceae) Herb 1000-2000m	Cuts and wounds	Leaves	Paste	Least concern	Deforestation Excessive grazing	Ageratochromene, β-Sesquiphelandrene and β-Sinenesal.	(Gaur, 1999) (Pande *et al*., 2006) (Raj *et al*., 2018)
13.	*Ajuga bracteosa* Wall. ex Benth. (Lamiaceae) Herb 2000-4000m	Abdominal pain and Jaundice	Entire plant	Decoction Powder Paste	Endangered	Construction activities Excessive harvesting Landslides	Anthocyanidin-glucosides, Arabinose, Cerotic acid, Ceryl alcohol, d-glucoside, Glycoside, Palmitic acid, and Tannin	(Pande *et al*., 2006) (Ahmad and Habib, 2014) (Tali *et al*., 2016)
14.	*Ajuga parviflora* Benth. (Lamiaceae) Herb	Cough, fever, headache, and stomach problems	Leaves	Powder Decoction	Endangered	Over-grazing by livestock Overharvesting for local use Constructional activities Deforestation	Cerotic acid, Ceryl alcohol, Glycosides, Palmitic acid, Steroids and Tannins.	(Akriti Pal *et al*., 2011) (Joshi *et al*., 2016)
15.	*Allium sativum* L. (Amaryllidaceae) Herb	Arthritis, Metabolic syndromes, and respiratory disorders	Leaves	Paste	Least concern	-	-	(Gupta *et al*., 2013)
16.	*Angelica glauca* Edgew. (Apiaceae) 2500–4000m Herb	Abdominal pain, bronchitis, cold, constipation, cough, dyspepsia and stomach disorders	Roots	Powder	Critically endangered	Over-grazing by livestock Overharvesting for local use	Butylidene phthalide, Germacrene-D, Lingustilide, Nerolidol, Thujene, Trans-carveol, α −Phellandrene, β −Bisabolene, β-Pinene, β−Caryophyllene and γ −Terpinene.	(Agnihotri *et al*., 2004) (Pandey *et al*., 2011) (Vikram, 2014)
17.	*Anthemis cotula* L. (Asteraceae) Herb 1300-1500m	Insect bite, muscular pain and skin diseases	Entire plant	Decoction Paste	Valnurable	Invasive speices	Aromadendrene, Benzyl salicylate and Nonadecane.	(Rezaee and Jaimand, 2007)
18.	*Arisaema jacquemontii* Blume (Araceae) Herb	Boils, cough, skin diseases and snake bite	Rhizome	Powder	Least concern	Deforestation Excessive livestock grazing Land slides	Ariseminone	(Hemlata Verma *et al*., 2012) (Roshan *et al*., 2017)
19.	*Arnebia benthamii* Wall. ex-G. Don. (Boraginaceae) 3000-3800m Herb	Asthama, digestive disorders, fever, hair fall and headache	Entire plant	Powder Decoction	Critically endangered	Over-grazing by livestock Landslides Overexploitation for local use Illicit trade	Glycosides and Saponins.	(Rana *et al*., 2012) (Shameem *et al*., 2015)
20.	*Arnebia euchroma* Royle Johnston. (Boraginaceae) 2800-4800m Herb	Cold, cuts, earache, toothache, and wounds	Roots	Decoction	Endangered	-	Arnebinone and Butyryl alkannin.	(Singh *et al*., 2015) (Vikram, 2014)
21.	*Artemisia absinthium* L. (Asteraceae) Herb	Abdominal pain, Dandruff, diabetes, fever, intestinal worm and stomachache	Entire plant	Powder Juice Decoction	Vulnerable	Overharvesting for local use Landslides Overexploitation for fodder	Artemisia ketone, Chrysanthenyl acetate, Cineole, Curcumene, Linalool, α-Thujone and β-Thujone.	(Sharopov *et al*., 2012) (Nigam *et al*., 2019)
22.	*Artemisia annua* L. (Asteraceae) 3000-4000m Herb	Abdominal pain, malaria, and parasite diseases	Leaves and stem	Paste	Least concern	-	Artemisinin, Camphor, α-Gurjunene, α-Pinene and β-Eudesmol.	(Nigam *et al*., 2019)
23.	*Artemisia brevifolia* Wall. (Asteraceae) 2100–3000m Herb	Blood ailments, fever and Gastro-intestinal disorder	Entire plant	Decoction	Least concern	-	Camphor, Carvone, Caryophyllene, Chrysanthenone, Chrysanthenyl propionate, Elixene, Pinocarveol and Piperitone	(Abad *et al*., 2012) (Nigam *et al*., 2019)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
24.	*Artemisia nilagirica* C.B.Clarke Pamp. (Asteraceae) 2500–3600m .Herb	Asthma, intestinal worms, nervous disorder, and skin diseases	Entire plant	Paste Juice	Least concern	-	Borneol, Camphor, Caryophyllene oxide, Farnesol, Germacrane D, Limonene, Linalool, Lynalyl acetate, Myrtenol, Thujanol and β-Thujone.	(Abad *et al*., 2012)
25.	*Artemisi roxburghiana* Besser Var. purpurascens Jacq (Asteraceae) 2600–3600m Herb	Boils, fever and skin diseases	Leaves and stem	Juice	Vulnerable	-	Borneol, Camphor, Caryophyllene, Eugenol, Humulene, Linalyl acetate and Thujone; 1,8-cineole.	(Joshi *et al*., 2016)
26.	*Artemisia scoparia* Waldst. & Kit. (Asteraceae) 2200-2900m Herb	Blood pressure, digestive diseases, ear diseases, fever and skin	Entire plant	Juice	Vulnerable	Over-grazing by livestock Overharvesting for local use Landslides	1-Phenyl-2, 4-pentadiyne, Capillene, Myrcene, p-Cymene, β- Pinene, β-Caryophyllene and γ−Terpinene.	(Joshi *et al*., 2016)
27.	*Artemisia sieversiana Ehrh*. (Asteraceae) 2800–3600m Herb	Inflammation, kidney pain, skin problem and urinary disorders	Entire plant	Decoction	Vulnerable	Over-grazing by livestock Overharvesting for local use	1,8-Cineole, Borneol, Camphor, Eucalyptol and Geranyl butyrate.	(Abad *et al*., 2012)
28.	*Artemisia* vulgaris L. (Asteraceae) 2000-3000m Herb	Fever and malaria	Entire plant	Juice Powder	Least concern	-	Davanone, Germacrene-D, Isobornyl isobutyrate, Limonene and Rose oxide	(Haider *et al*., 2014)
29.	*Asparagus racemosus* Willd. (Asparagaceae) 1000-2800m Shrub	Aphrodisiac, diabetes, dysentery, epilepsy, gynecological problems, spermatorrhoea and tonic	Roots and rhizome	Decoction and powder	Endangered	Excessive livestock grazing Excessive harvesting	-	(Jadhav & Bhutani, 2006) (Sharma & Bhatnagar, 2010) (Ganie *et al*., 2019)
30.	*Atropa acuminata* Royle ex-Lindl (Solanaceae) 2000–3600m Climber	Asthma, burns, eye diseases, inflammation, narcotic, rheumatic pain and sedative	Roots and leaves	Powder Paste Juice	Endangered	Deforestation Over exploitation for local use	Scopolamine and Tropane.	(Ashtiania & Sefidkonb, 2011)
31.	*Azadirachta indica* A. Juss (Meliaceae) Tree 1200–2500m	Backache, diabetes, eye ailments, fracture, general weakness, jaundice, malarial fever and skin diseases	Bark and leaves	Decoction Powder Juice	Least concern	-	Aromoline, Berbamine, Berberine, Karachine, Oxyberberine, Oxycanthine Taxilamine and Palmatine.	(Radha *et al*., 2013) (Vikram, 2014)
32.	*Berberis asiatica* Roxb. ex-DC (Berberidaceae) 1500–2500m Shrub	Diabetes, eye infection, fever and jaundice	Stem, roots and bark	Powder	Least concern	-	Berbamine, Berberine, Colunbamamine, Jatrrohirine, Oxyacanthine, Oxyberberine, Palmitine and Tetrahydropalmitine	(Andola *et al*., 2010) (Andola *et al*., 2011) (Bisht *et al*., 2012) (Vikram, 2014)
33.	*Berberis chitria* Buch. Ham ex-Lindl. (Berberidaceae) Shrub	Diabetes, eye infection and stomachache	Roots	Decoction Juice	Vulnerable	Over-grazing by livestock Overharvesting for local use	-	(Pandey *et al*., 2007) (Vikram, 2014)
34.	*Berberis lycium* Royle (Berberidaceae) 1200–3000m Shrub	Boils, chest problems, eye diseases, jaundice, stomach disorders, toothache and wounds	Roots	Paste Juice Decoction	Vulnerable	Over-grazing by livestock Overharvesting for local use Constructional activities in natural areas	Berberine, Flavonoids, Palmatine, Phenols, Tannin, Terpenoids, Vasicin and Vasicinone.	(Kapoor *et al*., 2013) (Rahman *et al*., 2016) (Thakur *et al*., 2016)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
35.	*Bergenia ciliata* (Haw.) Strenb (Saxifragaceae) 1900–3000m Herb	Cold, cough, diarrhoea, digestive disorders, fever, kidney stone and skin diseases	Leaves, roots and rhizome	Powder Paste	Vulnerable	Excessive harvesting Landslides	Bergenin, Catechin, Gallic acid, Galloylcatechin, Glucoside, Metarbin, Mucilage, Tannic acid, Tannins, and Wax.	(Uniyal & Shiva, 2005) (Negi & Chauhan, 2009) (Radha *et al*., 2013)
36.	*Betula utilis* (D. Don.) (Betulaceae) 2800–4200m Tree	Anaemia, bronchitis, burns, hysteria, jaundice, leprosy, obesity, primogenital diseases and rheumatism	Bark and roots	Powder Paste Juice	Endangered	Deforestation	Betulic acid, Betulin, Champacol, Cineol, Geranic acid, Terragon, β-Linalool, β-Seleneol and β-Sesquiphellendrene.	(Zaki *et al*., 2011) (Pal *et al*., 2015) (Bobrowski *et al*., 2017)
37.	*Bistorta amplexicaulis* (D. Don) Greene (Polygonaceae) Herb 2000-3000m	Dysentery	Roots	Dried roots Decoction	Least concerned	-	-	(Pande *et al*., 2006)
38.	*Bombax ceiba* Linn Saimel (Bombacaceae) 500-1500m Tree	Digestive disorders and snake bite	Flowers and leaves	Paste Decoction	Least concern	-	-	(Pant & Samant, 2010) (Sharma *et al*., 2011)
39.	*Bupleurum falcatum* L. (Apiaceae) 2100–3900m Herb	Abdominal pain and liver diseases	Entire plant	Decoction	Least concern	-	Flavonoids, Monoterpene glycosides, Quinic acid derivatives and Saikosaponins.	(Rana & Samant, 2011)
40.	*Cannabis sativa* L. (Cannabaceae) 1600–2400m Herb	Arthritis, dandruff, diarrhoea, ear pain, menstrual disorder, rheumatism, and skin diseases	Entire plant	Juice Powder Juice	Least concern	-	Alkaloids, Cannabidiol (CBD), Cannabigerol, Cannabinoids-Tetrahydrocannabinol (THC), Cannabinol (CBN), Saponin, Steroids, β-Caryophyllene,Tannins and Terpenes.	(Audu *et al*., 2014) (Zou & Kumar, 2018)
41.	*Capsella bursa-pastoris* (L.) Medik. (Brassicaceae) Herb	Abdominal pain and gastrointestinal problem	Entire plant	Powder	Vulnerable	Excessive grazing by livestock	-	(Ibrar *et al*., 2014)
42.	*Cedrus deodara* (Roxb.) Loud. (Pinaceae) Tree 1600-3000m	Asthma, dysentery, fever, rheumatism, scabies, ulcer, urinary disorder and wounds	Bark and leaves	Oil Paste Powder	Endangered	Excessive grazing by livestock Exploitation for local use	-	(Singh & Samant, 2010)
43.	*Celtis australis* L. (Cannabaceae) Tree	Cardiovascular problems and fractured bones	Bark	Juice Juice Paste	Least concern	-	-	(Sharma *et al*., 2011) (Sufyan *et al*., 2018)
44.	*Centella asiatica* (L.) Urb. (Apiaceae) 200-2000m Herb	Dysentery, eye problems, headache, skin diseases and tonic	Leaves	Paste Juice Powder	Least concern	-	-	(Brinkhaus *et al*., 2000) (Mathur & Joshi, 2013)
45.	*Chenopodium botrys* Linn (Chenopodiaceae) 2200-2600m Herb	Stomach problems and urinary problems	Entire plant	Infusion	Least concern	-	11-dien-6α-ol, Botrydiol, Elemol, Elemolacetat, Selina-3, Seline-11-en-4α-ol, α-Chenopodiol and α-Eudesmol acetat.	(Pant & Samant, 2010) (Singh & Rawat, 2011) (Andov *et al*., 2014)
46.	*Cichorium intybus* L. (Asteraceae) Herb	Fractured bones, gynecological problems, skin diseases and wound	Fruits	Decoction Ripe fruit	Endangered	Overgrazing by livestock Overharvesting by locals	Anthocyanins, Cardiac glycosides, Flavonoids, Saponins, Tannins and Terpenoids.	(Shad *et al*., 2013) (Nwafor *et al*., 2017) (Mir *et al*., 2022)
47.	*Cinnamomum tamala* Buch Ham. Nees & Ebermaeir (Lauraceae) 500-2000m Tree	Cough and cold	Bark and leaves	Paste Powder	Endangered	Overgrazing by livestock Overharvesting by locals	α-pinene, Camphene, Cymene, Eugenol limonene and Myrcene.	(Sharma *et al*., 2011) (Sharma & Nautiyal, 2011) (Radha *et al*., 2013)
48.	*Cirsium wallichii* DC. (Asteraceae) Herb 2000-2500m	Dysentery	Roots	Dried	Least concern	-	Acetylenes, Alkaloids, Flavonoids, Phenolic Acids, Lignans, Polyacetylenes, Sesquiterpene and Lactones.	(Gaur, 1999) (Pande *et al*., 2006) (Jordon-Thaden & Louda, 2003)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
49.	*Codonopsis rotundifolia* Benth. (Campanulaceae) Herb	Metabolic conditions	Entire plant	Juice	Least concern	-	Coniferaldehyde, Coniferoside, Dillapiole and Sinapinaldehyde.	(Gupta *et al*., 2013)
50.	*Colebrookia oppositifolia* J. E. Smith (Lamiaceae) 1000-1500m Shrub	Cuts and wounds	Leaves	Paste	Least concern	-	-	(Pant & Samant, 2010) (Radha *et al*., 2013)
51.	*Cotoneaster microphyllus* Wall ex-Lindl. (Rosaceae) Shrub	Cuts, diarrhoea and wounds	Leaves, fruit and roots	Paste Juice	Vulnerable	Deforestation	-	(Gaur, 1999) (Pande *et al*., 2006)
52.	*Cuscuta europaea* Linn (Cuscutaceae) 2200-2600m Climber	Earache, hair problems, jaundice, joint pain and skin diseases	Entire plant	Juice Paste	Least concern	-	-	(Singh & Rawat, 2011) (Radha *et al*., 2013)
53.	*Cynodon dactylon* L Pers. (Poaceae) Herb 1500-2500m	Diuretic, jaundice, respiratory disorders, and vomiting	Entire plant	Decoction Paste	Least concern	-	-	(Pande *et al*., 2006) (Harun *et al*., 2017)
54.	*Dactylorhiza hatagirea* D. Don Soo (Orchidaceae) 3000-3800m Herb	Bone fracture, cuts, diarrhea and wounds	Roots	Powder Decoction Paste	Endangered	Overharvesting for local use Over-grazing by livestock	Resveratrol and trans stilbenes	(Rana & Samant, 2011) (Vikram, 2014) (Dhiman *et al*., 2019)
55.	*Delphinium denudatum* Wall Ex Hook F & Thomson (Ranunculaceae) 2000-2500m Herb	Body swelling, snake bite and toothache	Roots	Paste	Critically endangered	Overharvesting for local use Over-grazing by livestock	-	(Singh & Rawat, 2011)
56.	*Dioscorea deltoidea* Wall. ex Griseb (Dioscoreaceae) 1200-3000m Climber	Fever, genitourinary disorders, respiratory problems, and stomach problems	Rhizome	Powder Decoction Paste	Critically endangered	Landslide Deforestation Overharvesting for local use Over-grazing by livestock	Diosgenin (Cortisone, pregnenolone, progesterone), Sapogenins (Steroids or triterpenes) and Stigmasterol.	(Pant & Samant, 2010) (Singh & Rawat, 2011) (Dangwal & Chauhan, 2015)
57.	*Dioscorea villosa* (Dioscoreaceae) 1500-2500m Climber	Cough, fever, gastrointestinal problems and gynecological problems	Leaves	Powder Decoction Paste	Endangered	Soil erosion Over-grazing by livestock Overharvesting for local use Deforestation	Diosgenin, Sapogenins and Stigmasterol.	(Pant & Samant, 2010) (Vikram, 2014)
58.	*Dipsacus inermis* Wall. (Caprifoliaceae) Herb	Bone fracture	Leaves	Paste Powder	Least concern	Over-grazing Overharvesting for local use Constructional activities Landslides	8-Methyldotriacontan-7-ol, Dipsacol and Triacontan-3-one.	(Zhao & Shi, 2011) (Vikram, 2014)
59.	*Engelhardtia spicata* Lesch Ex-Blume (Juglandaceae) 900-1200m Tree	Boils, cuts, diarrhoea and wounds	Bark	Paste	Least concern	-	-	(Bhattarai *et al*., 2020)
60.	*Equisetum arvense* L. (Equisetaceae) Herb	Gastrointestinal problems, jaundice, skin diseases and wound	Entire plant	Powder Juice Paste	Least concern	Grazing	-	(Carneiro *et al*., 2019)
61.	*Eupatorium adenophorum* Sprengel (Asteraceae) 900-1200m Shrub	Cold, cough, cut, skin diseases and wounds	Leaves	Juice Decoction Paste	Least concern	-	-	(Pant & Samant, 2010) (Singh & Rawat, 2011) (Radha *et al*., 2013)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
62.	*Euphorbia royleana* Boissier. (Euphorbiaceae) 900-1200m Shrub	Antiseptic, gastrointestinal problem and germicidal	Entire plant	Powder	Least concern	-	-	(Radha *et al*., 2013) (Ashraf *et al*., 2016)
63.	*Ficus auriculata* Lour. (Moraceae) Tree	Dysentery and stomachache	Fruit	Bare fruit	Least concern	-	-	(Pande *et al*., 2006)
64.	*Ficus palmata* Forssk. (Moraceae) Tree 1300-2000m	Antiseptic, constipation, cuts dysentery, skin diseases and wounds	Fruit	Bare fruit	Least concern	-	Alkaloids, Cardiac glycosides, Flavonoids, Tannins and Terpenoids	(Vikram, 2014) (Kumar & Kumar, 2014) (Abbasi *et al*., 2015)
65.	*Fritillaria cirrhosa* D.Don (Liliaceae) Herb	Dermatological disorders and gynecological problems	Fruits	Ripe fruit	Endangered	Constructional activities Unregulated tourism Overharvesting for local use Over-grazing by livestock	-	(Wang *et al*., 2020) (Kumar *et al*., 2021)
66.	*Galinsoga parviflora* Cav 1600-2200m (Asteraceae) Herb	Indigestion and snake bite	Leaves	Juice Paste	Least concern	-	3,4-Dimethoxycinnamic acid, 7-Hydroxy-β-sitosterol, 7-Hydroxystigmasterol, Fumaric acid, Phytol, Protocatechuic acid, Stigmasterol, Triacontanol, and Uracil.	(Pande *et al*., 2006) (Devi *et al*., 2023)
67.	*Galium asperifolium* Wall. (Rubiaceae) Herb	Skin diseases	Leaves	Juice Decoction	Least concerned	-	-	(Gaur, 1999) (Pande *et al*., 2006)
68.	*Geranium wallichianum* D. Don ex Sweet (Geraniaceae) Herb	Dysentery, fever, eye infection, earache, and toothache.	Leaves and roots	Paste Powder Decoction	Rare	Excessive harvesting Landslides	2,4,6-trihydroxyethylbenzoate and Herniarin.	(Shinwari & Khan, 2003) (Qureshi *et al*., 2009) (Ismail *et al*., 2012) (Rahman *et al*., 2016)
69.	*Hedychium spicatum* Bach.-Ham. Ex J.E. Smith (Zingiberaceae) 1000-2000m Herb	Asthma, bronchitis, diarrhoea, dyspepsia, gastric trouble and liver diseases	Rhizome	Juice Powder	Vulnerable	-	-	(Uniyal & Shiva, 2005) (Semwal *et al*., 2010) (Vikram, 2014)
70.	*Heracleum candicans* Wall.ex DC. (Apiaceae) 1700–3100m Herb	Infertility, gynaecological disorders, and joint pain	Fruit and roots	Decoction Powder	Vulnerable	Over-grazing by livestock Landslides/soil erosion Constructional activities	1, 8-cineole, Caryophyllene oxide, Germacrene D, Linalool, Pimaradiene, Sabinene, and trans-Sabinene hydrate.	(Butola & Badola, 2006) (Butola *et al*., 2010) (Joshi *et al*., 2016)
71.	*Hypericum oblongifolium* Choisy (Hyperiaceae) Shrub	Boils, diarrhea and wounds	Leaves	Juice	Least concern	-	-	(Pande *et al*., 2006)
72.	*Indigofera heterantha* Wall. ex-Brandis (Fabaceae) Shrub	Cough, dysentery and toothache	Leaves and seeds	Juice Powder Paste	Least concern	Over-grazing by livestock Overharvesting for local use Landslides/soil erosion	-	(Rahman *et al*., 2016) (Rahman *et al*., 2018)
73.	*Inula racemosa* Hook f. (Asteraceae) 1500-2500m Herb	Asthma, bronchitis, cough and heart conditions	Roots	Powder	Critically endangered	Excessive grazing by livestock Overharvesting for local use Constructional activities Deforestation	Alantolactone, Aplotaxene, Daucosterol, dihydro-Alantolactone, dihydroiso-Alantolactone, Inunolide, isoAlantolactone, Isonitrile, Phenylacetonitrile and Sitisterol.	(Wang KeTai *et al*., 2000) (Sharma *et al*., 2016) (Rathore *et al*., 2022)
74.	*Ipomoea nil* L Roth. (Convolvulaceae) Climber	Skin diseases	Entire plant	Paste Decoction	Least concern	-	-	(Pande *et al*., 2006)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
75.	*Juglans regia* L. var kumaonica DC. (Juglandaceae) 1000-3000m Tree	Skin diseases, intestinal worms and toothache	Bark, leaves and fruit	Decoction Ripe Fruit Paste	Least concern	-	Juglones, Palmitic acid and Quercetin 3-glycosides	(Singh & Rawat, 2011) (Gairola *et al*., 2014) (Rahman *et al*., 2016)
76.	*Jurinea dolomiaea* Boiss (Asteraceae) 3200-4500m Herb	Fever and pain	Roots and leaves	Paste Juice	Vulnerable	Deforestation	-	(Singh & Rawat, 2011) (Bhat *et al*., 2013)
77.	*Lamium album* Linn (Lamiaceae) 1600-1900m Herb	Bleeding after childbirth, burns and wounds	Leaves and flowers	Decoction Juice Juice	Endangered	Land sliding. Deforestation	2-Ethyl furan, 2-Heptanol, 3-Methylbutanal, 3-Octanone, 6,10,14-Trimethyl-2-pentadecanone, and Verbascoside.	(Gaur, 1999) (Singh & Rawat, 2011) (Morteza-Semnani *et al*., 2016) (Kelayeh *et al*., 2019)
78.	*Leucas lanata* Benth. (Lamiaceae) Herb 1000-3000m	Cold, cough and Wounds	Leaves	Juice	Least concern	-	Caffeic acid, Chlorogenic acid, Ferulic acid, Gallic acid and Protocatechuic acid	(Singh & Rawat, 2011) (Dixit *et al*., 2015)
79.	*Litsea glutinosa* (Lour.) Robinson (Lauraceae) 1000-1500m Tree	Broken bones.	Bark	Paste	Least concern	-	-	(Gaur & Sharma, 2011) (Sharma *et al*., 2011)
80.	*Lyonia ovalifolia* (Wall.) Drude (Ericaceae) 1200-3200m Tree	Boils and wounds	Seeds	Paste Juice	Least concern	-	-	(Rana *et al*., 2010) (Radha *et al*., 2013)
81.	*Malaxis acuminata* D. Don (Orchidaceae) 1500-3500m Herb	Bronchitis and fever	Rhizome	Powder	Least concern	-	-	(Rautela *et al*., 2023)
82.	*Mallotus philippensis* (Lam.) Muell.-Arg. (Euphorbiaceae) 300–1800m Tree	Antihelmintic, constipation, cuts, dysentery, skin diseases and wounds	Leaves and fruit	Paste Powder	Vulnerable	Overgrazing Overharvesting	-	(Sharma *et al*., 2011) (Radha *et al*., 2013)
83.	*Malva sylvestris* L. (Malvaceae) Herb	Diarrhea and dysentery	Entire plant	Powder	Least concern	-	-	(Hakeem, 2019)
84.	*Matricaria chamomilla* Linn. (Asteraceae) 2000-4000m Herb	Aromatherapy, respiratory disorders and stomachache	Flowers and leaves	Decoction	Least concern	Excessive harvesting Climate change	-	(Kaur *et al*., 2016)
85.	*Meconopsis aculeata* Royle (Papavaraceae) 3000–4200m Herb	Cardiac diseases, gynaecological disorders, headache, ulcer and wounds	Entire plant	Powder Paste	Endangered	Over-grazing by livestock Overharvesting for local use Landslides/soil erosion Constructional activities	Alkaloids and Phenols	(Mudasar Ahmad *et al*., 2016)
86.	*Megacarpaea polyandra* Benth (Brassicaceae) 2200-2600m Herb	Abdominal pain, fever and stomachache	Roots	Paste Powder	Vulnerable	-	-	(Singh & Rawat, 2011)
87.	*Melothria heterophylla* (Lour.) Cogn. (Cucurbitaceae) Climber 1200-2500m	Cold, cuts and fever	Leaves and fruit	Juice	Least concern	-	-	(Pande *et al*., 2006)
88.	*Morina longifolia* Wall. ex DC (Dipsacaceae) 2200-2600m Herb	Boils, burns, cuts and snake bite.	Entire plant	Paste Decoction	Vulnerable	Deforestation	-	(Singh & Rawat, 2011) (Vikram, 2014)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
89.	*Myrica esculenta* Buch-Ham ex-D. Don. (Myricaceae) Tree 1400-2000m	Asthma, cough, diarrhoea, dysentery, fever and wound	Bark and fruit	Powder Ripe Decoction	Least concern	-	-	(Uniyal & Shiva, 2005) (Gusain & Khanduri, 2016)
90.	*Myrsine semiserrata* Wall. (Myricaceae) Shrub	Colic and menstral disorder	Fruit	Decoction	Least concern	-	-	(Gaur, 1999) (Pande *et al*., 2006)
91.	*Nardostachys jatamansi* DC (Valerianaceae) 3000-4000m Herb	Epilepsy, hairfall and heart related diseases	Rhizome	Powder	Critically endangered	Deforestation Overgrazing by livestock Overexploitation	Cinnamic acid, gallic acid and rutin p-coumaric acid	(Kanwal & Joshi, 2015) (Dhiman *et al*., 2020) (Dhiman & Bhattacharya, 2020)
92.	*Nasturtium officinale* W.T.Aiton (Brassicaceae) Herb	Abdominal pain, bone fracture and diarrhea	Entire plant	Juice Powder	Least concern	-	-	(Lata, 2020)
93.	*Ocimum basilicum L.* (Lamiaceae) 500-1000m Herb	Bronchitis, cold, cough, fever, toothache, and urinary disorder	Entire plant	Decoction	Rare	Diseases	Estragole, Eugenol, Linalool, Linolenic acid, Methyl chavicol, Palmitin 2-mono, Phytol, Stigmasterol, Tetradecanoic acid, n-Hexadecanoic acid, β-Sitosterol	(Gaur, 1999) (Tewari *et al*., 2012) (Ghani & Pai, 2015)
94.	*Origanum vulgare L.* (Lamiaceae) 1200-3000m Herb	Fever, menstrual complaints, respiratory disorders, stomach pain and toothache	Entire plant	Decoction, paste and powder	Least concern	Excessive harvesting	Alkaloids, Flavonoids, Glycosides, Oleanolic acid, Origanol A and B, Phenols, Saponins, Sterols, Triacontanol, Triterpenoids, Tannins, Ursolic acid and β-Sitosterol.	(Uniyal & Shiva, 2005) (Verma *et al*., 2010) (Singh & Rawat, 2011)
95.	*Oxalis corniculata* L. (Oxalidaceae) 1000-3000m Herb	Dysentery, eye problem, fever, insect bite, jaundice, scurvy, skin diseases and wounds	Entire plant	Paste Juice	Least concern	-	Flavonoids, Glycosides, Phenols, Phytosterols, Tannins and Volatile oil	(Mathur & Joshi, 2013) (Vikram, 2014)
96.	*Paeonia emodi* Wallich ex Royle (Paeoniaceae) 1800-2500m Herb	Abdominal pains, diarrhoea and vomiting	Entire plant	Paste	Least concern	Excessive livestock grazing and Excessive harvesting	-	(Gaur, 1999) (Vikram, 2014) (Ganie *et al*., 2019)
97.	*Paris polyphylla* Smith (Liliaceae) 1500-2800m Herb	Fever, headache, stomach problems and wounds	Rhizome	Paste	Vulnerable	-	-	(Rana *et al*., 2020) (Kunwar *et al*., 2021)
98.	*Parnassia nubicola* Wall. ex-Royle (Saxifragaceae) Herb	Snake bite and vomiting	Roots	Paste Juice	Least concern	-	Methanol	(Rao *et al*., 2011) (Radha *et al*., 2013)
99.	*Peperomia tetraphylla* (Forst. f.) Hook. & Arn. (Piperaceae) Herb 1500-3000m	Burn and wounds	Entire plant	Paste	Least concern	-	-	(Pande *et al*., 2006)
100.	*Phyllanthus emblica* Linn (Euphorbiaceae) 900-1200m Tree	Asthama, digestive problems, hair loss and skin diseases	Fruit	Paste	Least concern	-	-	(Radha *et al*., 2013)
101.	*Picrorhiza kurrooa* Royle ex Benth (Scrophulariaceae) 3200-4800m Herb	Abdominal pain, fever and stomachache	Roots	Powder Decoction	Endangered	Grazing	-	(Tiwari *et al*., 2010) (Chand *et al*., 2016) (Debnath *et al*., 2020)
102.	*Pimpinella diversifolia* DC. (Apiaceae) Herb	Cold, coughing and stomach problem	Fruit	Juice Powder	Least concern	-	-	(Kumar *et al*., 2024)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
103.	*Pinus roxburghii* Sarg. (Pinaceae) Tree	Boil, cuts and wounds	Leaves	Powder Paste Resin	Least concern	-	-	(Siddiqui *et al*., 2009)
104.	*Podophyllum hexandrum* Royle (Berberidaceae) 2500-4200m Herb	Bone fracture, cough, cut, dyspepsia, skin diseases and wounds	Leaves and roots	Paste Decoction Powder	Endangered	Deforestation Excessive grazing Excessive harvesting Constructional activities	Peltatin, Picropodophyllin, Podophyllic acid, Podophyllin, Podophylloquercin, Podophyllotoxin and Tannin.	(Haleema *et al*., 2006) (Chaurasia *et al*., 2012) (Bhat *et al*., 2013)
105.	*Prinsepia utilis* Royle (Rosaceae) Shrub 1300-3000m	Burns, cuts, diarrhea, rheumatism, stomachache and wounds	Bark, roots, fruit and seeds	Seed oil Juice	Endangered	Deforestation Excessive harvesting	-	(Pant & Samant, 2010) (Radha *et al*., 2013)
106.	*Prunus cerasoides* D. Don (Rosaceae) 2200-2600m Tree	Cuts, fractured bones and wounds	Bark and fruit	Decoction Juice	Least concern	-	-	(Pant & Samant, 2010) (Kumar *et al*., 2011)
107.	*Pyracantha crenulate* D. Don. M. Roem. (Rosaceae) Shrub	Digestive disorder and body pain	Fruit	Juice	Least concern	-	-	(Pande *et al*., 2006)
108.	*Pyrus pashia* Buch.- Ham. ex D. Don. (Rosaceae) Tree	Digestive diseases and eye infection	Fruit	Juice	Least concern	-	Lupeol and β-sitosterol	(Khandelwal *et al*., 2008) (Pant & Samant, 2010) (Radha *et al*., 2013)
109.	*Quercus leucotrichophora* A. Camus (Fagaceae) Tree 2000-2500m	Asthma, bronchial problem, digestive disorder, gonorrheal, hemorrhages and urinary disorder	Bark and seed	Resin Powder	-	-	-	(Kumar *et al*., 2011) (Rawat, 2016)
110.	*Quercus semecarpifolia* Smith. 2000-2500m (Fagaceae) Tree	Scratch and wounds	Leaves	Paste	Least concern	-	-	(Pande *et al*., 2006)
111.	*Ranunculus arvensis* L. (Ranunculaceae) Herb 1200-3000m	Diarrhea, fever and skin problems	Entire plant	Juice Paste Decoction	Least concern	-	-	(Gaur, 1999) (Pande *et al*., 2006)
112.	*Reinwardtia indica* Dumort. (Linaceae) Shrub 12000-2200m	Wounds and mouth wash	Leaves and flowers	Juice	Least concern	-	-	(Pande *et al*., 2006)
113.	*Rhamnus virgatus* Roxb (Rhamnaceae) Shrub 2,500 to 4,000m	Treating eye white spots, malarial fever and ringworms	Bark and leaves	Juice and paste	Least concern	Excessive livestock grazing	-	(Gaur, 1999) (Pant & Samant, 2010)
114.	*Rheum australe* D. Don (Polygonaceae) 3000-4000m Herb	Asthma, bronchitis, metabolic conditions, and wounds	Root and rhizome	Powder	Endangered	Excessive harvesting and Climate change	Anthraquinones (Aloe-emodin and Chrysophanol)	(Siddique & Jeelani, 2015) (Kanta *et al*., 2018) (Mala *et al*., 2021)
115.	*Rhododendron anthopogon* D. Don (Ericaceae) 3000-4000m Shrub	Arthritis, cold, cough, headache and rheumatism	Leaves and flowers	Powder	Vulnerable	Excessive harvesting Deforestation	Polyphenols, Quinones, Sterols and Triterpenes.	(Baral *et al*., 2014)
116.	*Rhododendron arboretum.* Smith. (Ericaceae) 1500-3200m Tree	Blood purifier, cardiac tonic, digestive diseases and fever	Flowers	Juice	Least concern	-	-	(Singh & Rawat, 2011) (Singh *et al*., 2015)
117.	*Rhus javanica* Linn (Anacardiaceae) 1600-1900m Tree	Body pain, cholera, fever and stomachache	Bark and fruit	Paste	Least concern	-	-	(Gaur, 1999) (Pant & Samant, 2010)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
118.	*Rhus parviflora* Roxb (Anacardiaceae) 1600-1900m Tree	Cholera, cough, cut, fever and wound	Leaves	Paste	Least concern	-	-	(Pant & Samant, 2010)
119.	*Rosa brunonii* Lindley (Rosaceae)2200-2600m Shrub	Cuts, diarrhoea and eye infections	Leaves and flowers	Juice Powder Paste	Least concern	-	-	(Radha *et al*., 2013)
120.	*Rosmarinus officinalis* Linn (Lamiaceae) 1200-2500m Herb	Boils, headache and skin disease	Leaves	Juice	Least concern	Excessive harvesting Excessive livestock grazing	-	(Phondani *et al*., 2016)
121.	*Rubia manjith* Roxb. ex-Fleming. (Rubiaceae) Climber 1300-300m	Headache, jaundice, skin problems and tonic	Roots and flowers	Paste Powder	Least concern	-	-	(Pande *et al*., 2006)
122.	*Rubus biflorus* Buch. Ham ex - Smith. (Rosaceae) Shrub	Diarrhoea	Fruit and roots	Decoction	-	-	-	(Pande *et al*., 2006)
123.	*Rubus ellipticus* -Smith. (Rosaceae) Shrub 1200-2200m	Constipation, digestive disorders, skin diseases and stomachache.	Fruit, leaves and roots	Paste Juice Decoction	Least concern	-	-	(Pande *et al*., 2006)
124.	*Rubus niveus* -Thunb. (Rosaceae) Shrub 1200-2200m	Dysmenorrhea, fever, headache, snakebite and stomachache	Fruit, leaves and roots	Juice Juice Decoction	Least concern	-	-	(Radha *et al*., 2013) (Vikram, 2014)
125.	*Rumex hastatus* D. Don. (Polygonaceae) Herb 1300-2300m	Antirheumatic, cuts, scurvy, stomach pain, tonic and toothache	Leaves, flower and roots	Juice Juice Powder Paste	Least concern	-	Alkaloids, Anthraquinone glycoside, Flavonoids, Hastatusides A and B, Nepodin, Orientaloside, Phenolic compounds, Resveratrol, Rumexoside, Rutin, Saponins, Tannins and Torachrysone-8-yl β-Dglucopyranoside.	(Shinwari & Gilani, 2003) (Pande *et al*., 2006) (Ahmad *et al*., 2015) (Rahman *et al*., 2016)
126.	*Rumex nepalensis* Sprengel (Polygonaceae) 2200-2600m Herb	Dysentery and stomach-ache	Leaves and roots	Powder Juice Paste	Least concern	-	Hexane and Methanol	(Pant & Samant, 2010) (Singh & Rawat, 2011) (Radha *et al*., 2013)
127.	*Salvia moorcroftiana* Wall. Ex Benth. (Lamiaceae) 1500–3000m Herb	Boils, chest diseases, cough, dysentery, haemorrhoids, headache, joint pain, stomach pain, throat swelling and wounds	Entire plant	Powder Paste	Least concern	-	Oxygenated monoterpenes, Oxygenated sesquiterpenes, Sabinene and β-Caryophyllene.	(Rather *et al*., 2011)
128.	*Sapindus mukorossi* Gaertn (Sapindaceae) 1500-2500m Tree	Eczema, freckles, hairfall and snakebite	Fruit	Ripe fruit	Least concern	Deforestation Overexploitation	-	(Mahar *et al*., 2012)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
129.	*Sarcococca saligna* D. Don. Muell. - Arg. (Buxaceae) 2200-2600m Shrub	Joint pain	Leaves and roots	Paste	Least concern	-	-	(Pant & Samant, 2010) (Singh & Rawat, 2011) (Radha *et al*., 2013)
130.	*Saussurea obvallata* (DC) Edgew. (Asteraceae) 3500-4200m Herb	Body pain, boils, cuts, fever, rheumatism and wounds	Entire plant	Paste	Critically endangered	Excessive grazing Excessive harvesting	-	(Joshi & Dhar, 2003) (Singh & Rawat, 2011)
131.	*Selinum tenuifolium* DC (Apiaceae) 2200-2600m Herb	Asthama, cough and toothache	Roots	Powder	Vulnerable	-	Derivative.	(Chauhan, 1999) (Singh & Rawat, 2011)
132.	*Selinum vaginatum* (Edgew.) C. B. Clarke (Apiaceae) 2200-2600m Herb	Skin diseases and toothache	Roots	Paste	Vulnerable	-	Derivative.	(Chauhan, 1999) (Singh & Rawat, 2011)
133.	*Smilax aspera* L. (Smilacaceae) 1200-2600m Climber	Diarrhoea, joint pain, skin diseases, snake bite and wounds	Roots and fruit	Paste Decoction Juice	Least concern	-	-	(Pande *et al*., 2006)
134.	*Solanum nigrum* L. (Solanaceae) 800-3000m Herb	Fever, headache, Liver tonic, skin diseases and stomachache	Leaves, fruit and roots	Paste Juice Decoction	Least concern	-	Alkaloids, Coumarins, Flavonoids, Glycosides, Saponins, Tannins and Terpenoids	(Mahmood *et al*., 2013) (Kayani *et al*., 2014) (Khan *et al*., 2015)
135.	*Stellaria media* (L.) Vill. (Caryophyllaceae) Herb	Boils, bone fracture, burns, skin diseases, stomach pain and wounds.	Entire plant	Paste Powder	Least concern	-	-	(Salam *et al*., 2011) (Rahman *et al*., 2016)
136.	*Syzygium cumini* (Linn.) Skeels (Myrtaceae) 900-1200m Tree	Bronchitis and diabetes	Bark, fruit and seed	Fruit Powder Decoction	Least concern	-	-	(Uniyal & Shiva, 2005) (Pant & Samant, 2010)
137.	*Tanacetum dolichophyllum* (Kitam.) Kitam. (Asteraceae) 2600–3800m Herb	Fever, indigestion, intestinal worms and stomach problems	Leaves	Juice Decoction	Least concern	-	(E)-β-Farnesene, cis-Lanceol, Neryl acetate, Terpinen-4-ol, α-Bisabolol, β-Eudesmol and β-Pinene.	(Haider *et al*., 2011)
138.	*Taraxacum officinale* Webb (Asteraceae) Herb 1300-2000m	Blood purifier, headache, jaundice, liver diseases, skin diseases and toothache	Entire plant	Juice Decoction Powder Paste	Least concern	-	1-Tridecanol and 20(30)-Taraxasten-3-ol	(Gairola *et al*., 2014) (Rahman *et al*., 2016)
139.	*Taxus baccata* L. (Taxaceae) 1800-3400m Tree	Anti-cancer, cold and fractured bones	Bark	Paste	Vulnerable	Deforestation Land sliding	-	(Jan Alam & Ali, 2010) (Radha *et al*., 2013) (Vikram, 2014)

Table 5. (Cont'd.).

S. N.O.	Scientific name	Ailment	Plant part used	Method of use	Conservation status	Threats	Major chemical constituents	References
140.	*Terminalia chebula* Retz (Comberataceae) 1000-1500m Tree	Asthma, cough and digestive disorders	Seeds and fruit	Powder	Least concern	-	β-sitosterol, Anthraquinone, Flavonol, Glycosides, Hydrolysabletannins, Phenolics and Triterpenoids.	(Malik *et al*., 2015)
141.	*Thalictrum foliolosum* DC. (Ranunculaceae) 1200-2200m Herb	Abdominal pain, blood purification, diuretic, fever, jaundice, leucoderma and toothache.	Roots	Powder Paste	Vulnerable	Excessive grazing Excessive harvesting	-	(Uniyal & Shiva, 2005) (Pande *et al*., 2006)
142.	*Trillium govanianum* Wall. ex D. Don (Melanthiaceae) Herb	Burns, diarrhoea, respiratory diseases and wounds	Roots	Powder	Endangered	Landslide Illicit trade	Brassoside, Diosgenin, Govanoside A, Pennogenin, Pennogenin E, Piosgenin, Polyphyllin VII, Sarsasapogenin and Trillarin.	(Rathore *et al*., 2020)
143.	*Urena lobata* L. (Malvaceae) Shrub	Body pain, diuretic and urinary problems	Leaves and roots	Paste	Least concern	-	-	(Pande *et al*., 2006)
144.	*Urtica dioica* Linn (Urticaceae) 3000-4500m Herb	Baldness, boils, joint pain, rheumatism, skin diseases, stomachache, toothache and wounds	Leaves and roots	Juice Paste Powder	Least concerned		12-octadecadienoic acid, Carbonic, Formic and Silicic.	(Vikram, 2014) (Rahman *et al*., 2016)
145.	*Valeriana jatamansi* Jones ex Roxb. (Caprifoliaceae) 1200-3200m Herb	Asthma, cholera, dysentery, skin diseases, stomachache and wounds	Roots and Rhizome	Powder	Endangered	Landslides Deforestation Excessive livestock grazing Excessive harvesting	3-Methylvaleric acid, Azulene, Kanokonyl acetate γ −Curcumene, Maaliol, Patchouli alcohol, Seychellene, Viridiflorol, ar-Curcumene, α −Bulnesene, α-Santalene, α−Guaiene, β −Gurjunene and β-Caryophyllene	(Uprety *et al*., 2010) (Vikram, 2014) (Joshi *et al*., 2016)
146.	*Viburnum cotinifolium* D. Don (Caprifoliaceae) Shrub 2000-2600m	Digestive disorder	Bark, leaves and fruit	Decoction	Least concern	-	-	(Pant & Samant, 2010)
147..	*Viola canescens* Wall. (Violaceae) 1000-2600m Herb	Cold, cough, fever and jaundice	Entire plant	Decoction	Least concern	-	Alkaloid violin, Glucoside methyl salicylate, Glycoside quercitin and Saponins	(Tiwari *et al*., 2010)
148..	*Withania somnifera* L. Dunal (Solanaceae) 500-1500m Herb	Carbuncles, cold, cough, epilepsy, ulcer and rheumatism	Leaves and Roots	Chew, juice and powder	Vulnerable	Excessive harvesting Climate change	-	(Aslam *et al*., 2017)
149..	*Woodfordia fruticosa* (Linn.) Kurz (Lythraceae) 1000-1800m Shrub	Dysentery	Flowers	Decoction Powder	Endangered	Excessive harvesting Excessive grazing	-	(Pant & Samant, 2010)
150..	*Zanthoxylum armatum* DC. (Rutaceae) 1000-2500m Shrub	Cold and toothache	Bark, seeds and stem	Powder Paste	Vulnerable	Excessive harvesting	Alkaloids, Benzenoides, Coumarins, Flavonoids, Glycosides, Lignin, Limonene, Linalool, Linoleic acid, Palmitoleic acid, Phenolics, Sterols and Terpenoids.	(Barkatullah *et al*., 2011) (Radha *et al*., 2013) (Rahman *et al*., 2016)

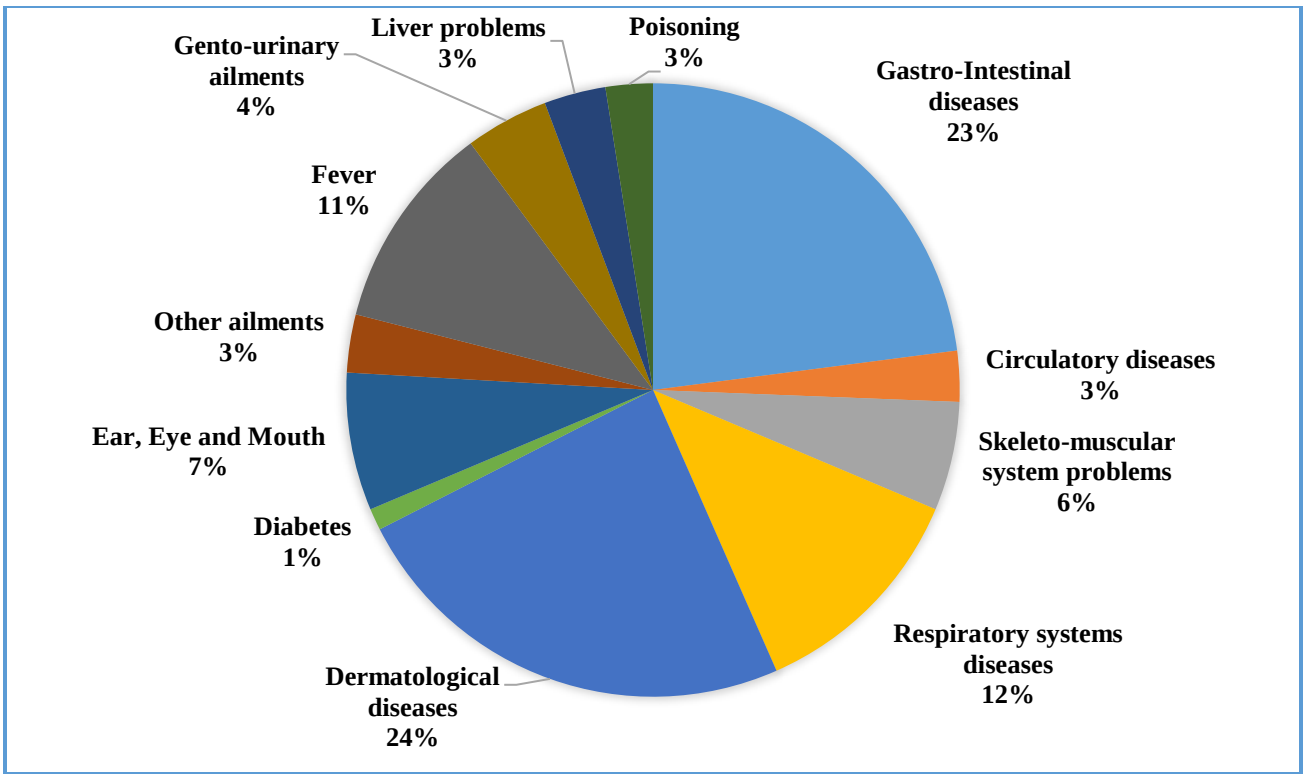

Fig. 4. Pie chart showing the percentage of different diseases.

Table 4. Diseases cured by the medicinal plants of Himalayas.

S. N.O.	Diseases	Number of plants
1.	Gastro-Intestinal diseases	120
2.	Circulatory diseases	14
3.	Skeleto-muscular system problems	30
4.	Respiratory systems diseases	63
5.	Dermatological diseases	126
6.	Diabetes	6
7.	Ear, Eye and Mouth	38
8.	Other ailments	16
9.	Fever	57
10.	Gento-urinary ailments	23
11.	Liver problems	17
12.	Poisoning	13

Conclusion

This study underlines the importance of these medicinal plants in dealing with global health concerns as a cheaper alternative to pharmaceuticals. The results have cultural significance alongside their possible financial value given the increasing demand for traditional and natural medical treatments around the globe. Understanding the need for sustainable harvesting and preservation methods is crucial for assuring the accessibility of these medical resources. Sustainable practices and the implementation of traditional knowledge may assist in preserving biodiversity and cultural heritage. The fact that Himalayan medicinal plants are widely used to treat a wide range of illnesses illustrates the importance of these plants from a cultural, medical, and economic standpoint. The ongoing utilization of these priceless resources depends on addressing common illnesses and investigating unrealized potentials for treating fewer common disorders while assuring conservation efforts. Great efforts are needed inline to Global initiatives to protect this treasure of nature for future generations.

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