

Observations on Traditional Phytotherapy among the Inhabitants of Lahaul Valley through Amchi System of Medicine—A Cold Desert Area of Himachal Pradesh in North Western Himalayas, India

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Abstract

The paper highlights the Phyto-diversity and indigenous uses an ecosystem existing in Lahaul Valley of tribal district of Lahaul and Spiti in Himachal Pradesh, India. This is one of the most preferred tourist spot especially for foreigners. The cold desert area of India is known for its specific topography, sense climate and unique vegetation. The valley is rich in high value medicinal wealth and local inhabitants (*Buddhist*) practice the Tebetan Amchi System of Medicine. Keeping in view the continuous pressure on nature, this paper reflects the Phyto-diversity of Valley, with reference to medicinal and aromatic plants and conservation mechanisms to protect the valuable wealth of the valley and also suggests effective ecotourism planning of the study area.

Keywords: Diversity, Medicinal and Aromatic Plants, Ecotourism, Lahaul Valley, Indigenous Uses, Tebetan Amchi System of Medicine

1. Introduction

Twenty one year ago the word did not know about the biodiversity. Today, it is one of the most commonly used expressions in the biological sciences and has become a household word. During the National Forum on Biodiversity held at Washington DC, w.e.f. September 21-24, 1986, under the auspices of the National Academy of Science, Smithsonian Institute, the word spread like fire throughout the world. In the Rio Environmental Summit in 1992, biodiversity dominated the central issues of scientific and political concern worldwide. At global level about 16,04,000 species of plants, animals and micro-organisms have been described so far. However, it is estimated that there are around 17,98,000 species. Of the total species, 4,22,000 flowering plants reported from the world, of which > 50,000 species are used for medicinal purpose.

The high altitude Himalaya is rich in endemic plants [1]. The increasing potential threat to biological diversity is an irreversible environment disorder that warrant im-

mediate remedial measures for sustainable conservation of biodiversity. It is believed that the excessive anthropogenic activities are the main cause of decline in population and availability of medicinal and aromatic plants in the Himalayan region [2-5]. The fast pace of tourism in high altitudinal areas are another important factor causing the damage of bio-diverse ecological system [6].

Himalaya is one of the mega biodiversity region of world [7]. The north western Himalaya consist unique habitats to sustain several endemic and rare plant taxa. The vegetation comprises evergreen forests with pure stands of *Pinus roxburghii*, *Pinus wallichiana*, *Quercus* spp., *Cedrus deodara*, *Abies pindrow*, *Picea smithiana*, *Taxus wallichiana* and *Juniperus* spp. in dry temperate and alpine regions representing various species composition make the valleys rich in phytodiversity.

The cold desert area covers 35 per cent of the total geographical area in Himachal Pradesh. A review of literature indicates very few studies on medicinal & aromatic plants and ethnobotany of tribal valley/area of Lahaul and Spiti district of Himachal Pradesh [1,8-13].

2. Materials and Method

2.1. Study Area

The present study has been carried out in Lahaul valley of Himachal Pradesh. The Lahaul valley lies between 31°44'57" and 32°59'57"N latitude and 76°46'29" and 78°41'34"E longitude. It is surrounded by the main Himalayan ranges on the North mainly Baralacha Pass, the mid Himalayan range or Pir Punjal on the South, the Kunjum range which separates Lahaul from Spiti on the East and the off-shoot of the Pir Punjal range on the West. In its West, the Chenab river flows into Pangi valley, while in the North-East the Yunan river flows into Zaskar. The Rohtang Pass (3978 m), the gate way to valley, connects Lahaul to Kullu district. The valley can be approached through Rohtang Pass (3978 m) by road to Lahaul from Kullu, Kunjum Pass (4740 m) road to Lahaul from Spiti, Baralacha Pass (5019 m) road to Lahaul from Leh, Kugti Pass (5043 m) partially by road and on foot, and Drati Pass (4725 m) by foot journey from Chaurah-Chamba to Lahaul.

The distinctive features of the valley are snow covered peaks, massive glaciers, view of bleak, sunny, higher mountain ranges and narrow river valleys. The valley represents few prominent lakes such as Chandratul, Surajtal, Sissutal and Neelkant along with many glaciers. Andrew Wilson denoted this valley as a "Valley of Glaciers" [14]. High mountains, water falls, Buddhists Gompas, Hindu Temples and trekking places are some of the attractions for tourists. The inhabitants belong to Hindu and Buddhist community.

The district contains 41 Panchyats. The total area of the district is 13,835 km², out of which 1,35,369 hectares are under Forests and 4459 hectares are under cultivation. The whole area of Lahaul is divided into four valleys namely, Pattan Valley, Myar Valley, Todh Valley and Tennen Valley. In the valley soil is more or less loam to sandy loam with gravel. In the vicinity of villages and nearby, denuded slopes are subjected to concentrated year round grazing; hence the soil is equally poor. On the northern aspects, in folds and hollows as also on easier slopes, the soil is fairly deep and fertile for tree growth. It is therefore, the best forests in the valley are on the left bank of the Chanderbha River.

Due to melting of snow, the soil from the upper slope is carried down to the lower slopes where the depth of the soil is deeper. At present, soil in this tract is partly protected by the vegetation. The climate of the area is dry temperate to alpine types and has distinct seasons. The summer is rainless due to high mountains. The rainy season receive very less rainfall. The winter season is comparatively a large *i.e.*, from late November to early

April. During this period, heavy snow fall occurs in the Valley.

The Lahaul valley is also known for its unique faunal diversity. Some of the prominent wild animals and birds are Ibex (*Capra ibex*), Bharal (*Pseudois nayaur*), Snow Leopard (*Panthera uncia*), Musk Deer (*Moschus chrysogaster*), Ghoral, (*Nemorhaedus goral*), Himalayan Marmot (*Marmota bobak*), Wild Yak (*Bos grunniens*), Himalayan Snow Cock (*Tetragallus himalayensis*), Himalayan Snow Pigeon (*Columba leuconota*), Crow (*Corvus caurinus*), Chukor (*Alectoris chukar*), Bar-headed Goose (*Anser indicus*), Snow Pigeon (*Columba leuconota*) and Himalayan Snow Cock (*Tetraogallus himalayensis*).

Man has been utilizing plant resources for various purposes since the time immemorial. The documentation of traditional knowledge would appear to be the "need of the hour" in view of the current demand for herb based products. Documentation serves to ensure the preservation of traditional information for future generations. It is also a step forward in the creation of a database on ethnobotanical notes. An attempt therefore, has been made here to document the indigenous uses of some important medicinal and aromatic plants of Lahaul; Valley.

2.2. Surveys and Data Collection

The Lahaul valley has been surveyed under an adhoc project funded by National Medicinal Plant Boards (NMPB) Govt. of India, New Delhi during 2008-2010 to generate information on indigenous uses of medicinal plants from the inhabitants. Information on medicinal plants was collected through Participatory Rural Appraisal (PRA). After interaction, the inhabitants were interviewed for utilization of medicinal plants and aromatic plants, mode of administration, occurrence in the area, etc. in different valley of the Lahaul valley.

3. Results

3.1. Treatment by Animal Parts

The amchies keep in their medicine bags animal organs like; dog or wolf tongue, antelope horns, snake flesh rabbit heart and bile of bear and tiger etc. for treatment in rheumatism, epilepsy and pulmonary and bronchial diseases.

3.2. Treatment with Mineral Water

Sulphur and mineral springs in Kullu-Manali and Ladhak area are frequently used in the treatment of headache and other diseases of brain.

3.3. Puncturing of Veins

The treatment consists of pricking the patient body with specially needles at certain points. Usually this therapy is uses for treatment of gout, blood and skin disorders.

3.4. Treatment by Mysticism

Treatment by Mysticism (Tantra-Mantra) is with influence with stars on human destiny. They treat the patient by looking at the horoscope for their evil and good stars.

3.5. Other Uses

3.5.1. Use of *Shilajit* as a Single Medicine

Shilajeet is used as a single medicine in old age, for genel debility and as an approdisiac. The medicine should be taken on an empty stomach with milk or lukeworm water. Peas and pigeons are forbidden in the diet while taking shilajit.

Dose: 8 mg in first week and thereafter 16 mg for 2nd, 3rd, and 4th week. Then the dose is increased by 2mg up to 7 weeks and then it should be maintained.

3.5.2. Other Minerals Used in the Theraphy Are

- Sulphur;
- Borax;
- Sodium Sulphate;
- Antimoni Sulphate;
- Sodium Bicarbonate;

- Yellow Arsenic;
- Serpentine;
- Quartz;
- Metals and Bhasmas.

4. Discussion

The present study reveals that there is an intimate relationship between the inhabitants of Lahaul valley, particularly native people and plants of their surroundings. During field studies, it was noticed that a vast treasure of hidden knowledge is lying with them especially with the old people living in the valley. A wide range of ailments/diseases ranging from common cold & cough to asthma, bronchitis, liver, stomach, heart, kidneys, and cuts and wounds to snakebites are treated by the traditional healers of the valley (*Amchies*) with the help of local plant remedies.

In total, 354 species of medicinal and aromatic plants belonging to 208 genera and 76 families were recorded from the Lahaul valley [15-17]. Out of the total 79 plant species of medicinal and aromatic plants belonging to 37 families and 64 genera have been discussed in the present paper which are used to cure more than two diseases (**Table 1**). The population of *Aconitum heterophyllum* (Critically endangered), *Picrorhiza kurrooa* and *Rheum emodi* (Engangered) and *Begenia stracheyi* and *Rhododendron anthopogon* (Vulnerable) according to IUCN categorization are very low.

Most of the plant species are in the altitudinal ranges

Table 1. Diversity, distribution and indigenous uses of some important medicinal plants and aromatic plants occurring in cold desert area of Lahaul valley.

| Taxa/Family | Local name | Altitudinal range (m) | Herb/Shrub/Tree | Parts used | Indigenous uses |
|------------------------------------|------------------------|-----------------------|-----------------|----------------|--|
| Alliaceae | | | | | |
| <i>Allium carolinianum</i> DC. | Keor, Jimboo | 3300 - 4000 | H | Leaf and bulbs | Stimulant, diuretic, given with milk after delivery); Soup making regarding the treatment of stomach infections. |
| Apiaceae | | | | | |
| <i>Angelica glauca</i> Edgew. | Chaura | 2700 - 3510 | H | Roots | It is beneficial in restoring kidney heat and treating anemia, debility, lung diseases, stomach disorders and fluid retention in the joints. |
| <i>Bunium persicum</i> B. Fedtsch | Kalagira | 2760 - 3700 | H | Seeds | Abdominal pain, cold, cough, fever, loss of appetite, back pain, liver problems, dysentery in domestic animals and also used as condiment. |
| <i>Carum carvi</i> L. | Gonyorog, Shingu Jeera | 2700 - 3650 | H | Seeds | It is used to alleviate the disorders of the lungs. Also used in eyes ailments. |
| <i>Chaerophyllum aromaticum</i> L. | Shakkara | 3000 - 3400 | H | Roots | Used against Indigestion; Roots along with mint leaves are acts as flavor agent. |

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|--|--|-------------|---|--------------------|--|
| <i>Ferula jaeschkeana</i> (L.) Vatke | Bakhyot , Kalyash | 2600 - 3400 | H | Roots and Latex | Used for pain of chest, backache despondency, fatigue, rheumatism and poultices. |
| <i>Heracleum candicans</i> Wall. ex DC. | Dundu, Raswal | 2690 - 3660 | H | Rhizomes | It is used to treat inflammation and pain caused by vulnerable fever, checks haemorrhage and abdominal cramps caused by the intestinal worms. It is also beneficial in treating leprosy. |
| <i>Selinum vaginatum</i> (Edgew.) Cl. | Matosal | 2710 - 3630 | H | Rhizomes | It is used to treat Cough, asthma, hysteria, nervus tonic, sedative, incense, spices, local liquor, antibacterial, analgesic. |
| Asteraceae | | | | | |
| <i>Achillea millefolium</i> L. | Chabu, Shugumentog | 2700 - 3600 | H | Flowering part | It is used as Carminative, tonic, stimulant, toothache, cough, cold, insect repellent and diaphoretic. |
| <i>Arctium lappa</i> L. | Pichawag | 3200 - 3420 | H | Roots | It treats Gastric, burns; burs used for repelling rodents. |
| <i>Artemisia biennis</i> Willd. | Karkatang, Khampa | 2510 - 3950 | H | Whole herb | Used against obesity. |
| <i>A. dracunculus</i> L. | Chamary, Burtse | 2500 - 4000 | H | Whole herb | Acts as Carminative for animals, throat infection, toothache and in menstrual cycle. |
| <i>A. maritima</i> L. | Seski, Nyurcha, Garpeg, Nyurchi, Sensi | 2600 - 3800 | H | Whole herb | Tonic used to remove abdominal parasites, anthelmintic, antiseptic, blood purifier, gastric disorder; Edible bunch grass used for storing the boiled water after sprinkling the sattu or roasted barley (<i>thukpa</i>). |
| <i>A. nilagarica</i> (Cl.) Pamp. | Chirmara | 2990 - 3490 | H | Whole herb | Abscess, analgesic, anthelmintic, antiseptic, antispasmodic, asthma, ear complaints, epilepsy, haemostat, headache, menstrual complaints, nervous disease, peptic ulcer, skin disease, sores, stomachache, tonic, vermifuge, wounds. |
| <i>Cichorium intybus</i> L. | Khibsha | 2710 | H | Seeds | Used to treat Fever, headache, vomiting, diarrhoea, joint pain, also act as blood purifier. |
| <i>Cousinia thomsonii</i> Cl. | Changchher, Bacha Chawag, Khibsha | 2720 - 4000 | H | Whole Herb | Cure body pain, swelling due to sprain, diuretic. |
| <i>Echinops cornigerus</i> DC. | Chawag | 2500 - 3500 | H | Whole Herb | Used to cure Cold, cough, promote teeth of infants, fever, urinary trouble, tonic, septic, food poisoning. |
| <i>Inulu racemosa</i> Hk. | Mano | 2600 - 3500 | H | Roots | It is used to treat Asthma, blood purify, stomach disease, rheumatism, liver complaint, fever, headache. |
| <i>Jurinella macrocephala</i> (Royle) Aswal | Dhoop | Above 3700 | H | Roots | Roots are Antiseptic, used to cure fever during child birth, laxative, skin eruption; Religious (incense in temples). |
| <i>Senecio graciliflorus</i> (L.) DC. | Zerjum | 3200 - 3800 | H | Whole Herb | Used as Antidote against insect bite, ring worm disease, pussied ear. |
| <i>Sonchus oleraceus</i> L. | Panu Aag | 2640 - 3830 | H | Latex | Used to treat jaundice and liver complaints. |

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| <i>Taraxacum officinale</i> Wigg. | Paranbala, Quanti, Sarkhen Mentok, Dudhi | 2710 - 3800 | H | Whole Herb | Used as bandage of cuts, headache, fever, liver, kidney, chronic disease of the digestive organs, cure jaundice, inflammation of the liver, loss of appetite, food poisoning, antibiotic, tonic, blood purifier, hepatitis, migrains, foreheads); Religious; Musical instrument; Temporary tattooing of hands. |
| Betulaceae | | | | | |
| <i>Betula utilis</i> D.Don | Bhojpatra, Shag, Bhuj | 3000 - 4000 | T | Bark and other aerial parts | Curing redness in eyes antiseptic, antiseptic, burns, cuts, contraceptive, ear complaints, hysteria, jaundice, spermicidal, Wounds. |
| Boraginaceae | | | | | |
| <i>Arnebia euchroma</i> Royle ex Benth. | Ratanjot, Khomig | 2650 - 4000 | H | Roots | Act as Abortifacient, hair tonic, also used to treat blood pressure, backache, headache); dye. |
| <i>Onosma hispida</i> Wall. ex G. Don | Kaume | 3410 - 3550 | H | Roots and leaves | Used as blood purifier, cuts, swells, ulcer, wound); Religious; (lamma people use the pink dye for lamistic ceremonies). |
| Campanulaceae | | | | | |
| <i>Codonopsis clematidea</i> (Schrenk) Cl. | Golchokpa | 2800 - 3500 | H | Flower and seeds | Used to treat Rheumatism, swelling due to sprain, and skin disease. |
| <i>C. ovata</i> Benth. | Golchokpa | 3400 - 3600 | H | laeves | Medicinal (Oxytoxic, wound). |
| Cannabaceae | | | | | |
| <i>Cannabis sativa</i> L. | Bhang, bang | 2600 - 3500 | H | Seeds, Leaves and Stem | Used to cure appetite, bowel complaints, bronchitis, cuts, dyspepsia, ear, eye complaints, gonorrhoea, narcotic, piles, skin disorder, skin eruption, cold, cough, convulsions, cramps, epilepsy, laxative, nerve stimulant, paralysis of tongue, sleeping pills Miscellaneous (local shoe: Pula is prepared). |
| Cassulaceae | | | | | |
| <i>Rhodiola heterodonta</i> (Hk. & Th.) A. Boriss. | Churupa | 2900 - 4000 | H | Aerial part | Used to treat Cough and lung infections. |
| Chenopodiaceae | | | | | |
| <i>Chenopodium botrys</i> L. | Sokann, Sanyek | 2500 - 3550 | H | Aerial part | Used to treat Gastric disorder, Gall bladder, liver diseases. |
| Cupressaceae | | | | | |
| <i>Juniperus communis</i> L. | Petada, Shukpa, Dhup | 2500 - 4000 | Sh | Entire herb | It is useful against treating Kidney disorder, malfunctioning of kidney, liver, bladder, heart disease, nervous disorder, oil—from barriers inhaled as vapors, or taken in the form of pills, dropsy mucous discharge, antibiotic for animal, repel flies); Fuel; Religious (smoke purifier, against evil sprits, leaves dipped three times in arak or chang as a mark of celebration). |
| <i>J. polycarpus</i> Boiss. | Shur, Leyur | 2500 - 4000 | T | Entire herb | Oil is used as antibiotic for animal, repel flies, nervous disorder, stomach cramp); Fuel; Timber; Religious (incense, smoke purifier, leaves dipped three times in arak or chang as a mark of celebration, against evil sprits). |

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| Dioscoreaceae | | | | | | |
| <i>Dioscorea deltoidea</i> Wall. ex Kunth | Kinsh | 2490 - 3000 | H | Tubers | | Tubers are Source of diosgenin, a steroidal sapogenin, oral contraceptive pills. |
| Elaeagnaceae | | | | | | |
| <i>Hippophae rhamnoides</i> D. Don | Sarla | 3100 - 3600 | T | Fruits and bark | | It is beneficial in treating diseases of the lungs, blood coagulation and blood cysts. |
| <i>H. salicifolia</i> D. Don | Sarla | 3100 - 3600 | T | Fruits and bark | | Used ty treat Cuts, ulcer, wounds, cough, fever, dandruff of hairs and skin disease); Edible; Fuel; Fodder; Small timber; Agricultural tools. |
| Ephedraceae | | | | | | |
| <i>Ephedra gerardiana</i> Wall. ex Stapf | Kiok, Buchchur, Chhe, Somlata | 2500 - 3900 | Sh | Stem and branches | | It is a rejuvenating agent and is useful against the treatment of haemorrhage, gall bladder, liver, spleen and all kinds of initial and chronic fevers. |
| <i>Cicer microphyllum</i> Benth. | Banyarts, Vana-nyarcha, Chiri | 2600 - 3800 | H | Whole herb | | Used to cure mouth disease tongue infection, jaundice. |
| Fumariaceae | | | | | | |
| <i>Corydalis govaniiana</i> Wall. | | 2700 - 3600 | H | Whole herb | | Used against excess formation of impure blood. Also used for drying up excess pus formation in lungs and visceral organs. Herb is also used to heal ruptured wounds and fractured bones. |
| Gentianaceae | | | | | | |
| <i>Swertia cordata</i> (G. Don) Cl. | | 2700 - 3600 | H | Whole herb | | Used in treatment of hot disorders of the gall bladder. |
| Geraniaceae | | | | | | |
| <i>Geranium nepalense</i> Sw. | Laljari, Gajaljhar | 2900 - 4000 | H | Roots | | Used to treat Cuts, jaundice, toothache, ulcer, wounds and stomach complaints. |
| <i>G. pratense</i> L. | Porlo | 2800 - 4000 | H | Whole herb | | Used as Naksur, black dye, stomach trouble, jaundice, gastric disorder. |
| Hypericaceae | | | | | | |
| <i>Hypericum perforatum</i> L. | - | 2500 - 2900 | H | Whole herb | | Used in inhancement of immunity, cures malarial fever, anti-depressant, anti-tumourous, anti-cancerous, anti-viral. |
| Iridaceae | | | | | | |
| <i>Iris kemaonensis</i> D. Don ex Royle | Praynal | 3000 - 3900 | H | Whole herb | | Medicinal (Epilepsy, fever, toothache). |
| Juglandaceae | | | | | | |
| <i>Juglans regia</i> L. | Akhrot, Ka, Kaboot | 2500 - 3000 | T | Laeves, Branches and fruits | | Fruit-coat & bark is useful for teeth cleaning, skin diseases, anthelmintic, astringent, toothache, fungicide, insecticides. |
| Lamiaceae | | | | | | |
| <i>Ajuga bracteosa</i> Wall. ex Benth. | Karku, Neelkanthi | 2600 - 3200 | H | Whole herb | | Used to treat Malarial fever and tonic for gastric problems. |
| <i>Mentha longifolia</i> (L.) Huds. | Takchi, Marini, Madaen | 2700 - 3600 | H | Whole herb | | Used as carminative, digestive, on wound to kill maggots. |
| <i>Origanum vulgare</i> L. | Lamay masha, Massow | 2700 - 3600 | H | Whole herb | | Used to cure bronchitis, colic, diarrhoea, bath to ladies after child birth. |

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|---|---|-------------|---|-------------|--|
| <i>Thymus linearis</i> Benth. | Kochi masha | 2730 - 3800 | H | Whole herb | Used as Antifungal, antibacterial, pain reliever during childbirth to mother, whooping cough, epilepsy, skin eruption, reduce excessive bile secretion, juice, alopecia or hair loss, spices phlegm counter spasmodic pains, stomach complaint, cold, toothache, kill hookworms, liver compliant, heating effect); |
| Liliaceae | | | | | |
| <i>Polygonatum cirrhifolium</i> (Wall.) Royle | | 3050 - 3120 | H | Whole herb | It restores body strength and is useful in the treatment of pain in kidneys and waist region, fluid retention in joints and impotency |
| <i>P. verticillatum</i> L. | | 2500 - 3650 | H | Whole herb | Used to cure Appetite, Nervine tonic, kidney trouble and also restores body strength |
| Malvaceae | | | | | |
| <i>Malva sylvestris</i> L. | Sotsal | 3100 - 3600 | H | Flowers | Used against treatment of Stomach cramp and whooping cough |
| <i>M. verticillata</i> L. | Mikanchi | 2700 - 2990 | H | Whole herb | It is used to treat dropsy, thirsts, diarrhea, infected sores and dilates all vessel in the body. |
| Orchidaceae | | | | | |
| <i>Dactylorhiza hatagirea</i> (D. Don.) Soo | Hathpanja | 3000 - 3400 | H | Tubers | Used as Antibiotic, wound healing, bone fracture, cough, cold, cuts, sexual disability, rheumatism, blood purifier, tonic, many ayurvedic and unani medicine preparations |
| Oxalidaceae | | | | | |
| <i>Oxalis corniculata</i> L. | | 3000 - 3300 | H | Whole herb | Used to cure Appetite, corns, cuts, dysantery, fever, jaundice, rickets, scurvey, stomachache, swelling, wart, cataract, conjunctivitis |
| Paparveraceae | | | | | |
| <i>Meconopsis aculeata</i> Royle | Chharbongcha, Chharmen | 3200 - 4000 | H | Whole herb | It is effective against the disorder of lungs, liver and inflammation. |
| Plantaginaceae | | | | | |
| <i>Plantago depressa</i> Willd. | Maran | 2610 - 3410 | H | Whole herb | It stops diarrhea and also beneficial in treating fevers. |
| <i>P. major</i> L. | Karecha | 2600 - 3450 | H | Whole herb | Used against the treatment of Fever, cough, gastric disorders and other stomach diseases |
| Podophyllaceae | | | | | |
| <i>Podophyllum hexandrum</i> Royle | Bankakri, Omo-shey, Braburchoi, Pindiyali | 2500 - 3700 | H | Entire herb | It is used for gyaecological diseases like menstrual irregularity, diseases of uterus. Also improves blood circulation, helps in delivery. |
| Polygonaceae | | | | | |
| <i>Bistorta affinis</i> Greene | Chunru, Kapad | 2700 - 4000 | H | Entire herb | Cures diarrhoea, check flatulence and also check dysentery |

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| <i>Rheum australe</i> Spreng. | Archo | 3015 - 3910 | H | Entire herb | It purges epidemic diseases and also beneficial in treating indigestion and flatulence. |
| <i>Rumex nepalensis</i> Spreng. | Napchati | 2500 - 3700 | H | Entire herb | Helps in treating Boils, colic, cooling, diuretic, dymenorrhoea, purgative, scurvy, swelling of muscle, stomachache. |
| Primulaceae | | | | | |
| <i>Androsace rotundifolia</i> Hardw. | Zigsolo marpo | 2730 - 3400 | H | Entire herb | Reduces excess serous fluid, fever, wound in the body and sudden swelling. |
| <i>Primula denticulata</i> Sm. | | 3100 - 3840 | H | Entire herb | It is useful in treating wounds, psoriasis and warts. |
| <i>P. rosea</i> Royle | | 3510-4000 | H | Entire herb | It is useful to cure muscular pain. |
| Ranunculaceae | | | | | |
| <i>Aconitum heterophyllum</i> Wall. ex Royle | Bonga, Atees Boa | 2900 - 3600 | H | Roots | It is an antidote against snake and scorpion bite and treats infectious fever. Also useful in treating intestine infections. |
| <i>A. violaceum</i> Jacq. ex Stapf | Dudatees, Jhimba | 3600 - 4000 | H | Roots | Used to cure cough, gastrointestinal complaints, renal pain, rheumatism and stomachache. |
| <i>Anemone rivularis</i> Buch.-Ham. | Chutrak | 3100 - 3560 | H | Entire herb | Restores digestive heat of the stomach. Also useful in treating indigestion, tumors of cold nature, helas infected wounds. |
| <i>Delphinium cashmerianum</i> Royle | Kasturi-chey, Nakamogoma, Panzi-la | 3000 - 4000 | H | Entire herb | It ius used against frequent occurrence of common cold and fever due to poisoning, helps to cure skin diseases. |
| <i>R. hirtellus</i> D. Don | Chepchamendok, Goodi, Seripetali | 2750 - 3500 | H | Entire herb | It stops diarrhoea, dries pus of wounds and useful in treatment of lice-infestation. |
| <i>Thalictrum minus</i> L. | Mobje-dung | 3200 - 3400 | H | Entire herb | Used against inflammation, turbid fever, unripe fever and diffused fever. |
| Rosaceae | | | | | |
| <i>Fragaria vesca</i> var. <i>nubicola</i> L. | Palla | 2500 - 4000 | H | Fruit and inflorescence | It reduces ous accumulated in the lungs and chest and also helps in treatment of inflammation of nerves. |
| Rubiaceae | | | | | |
| <i>Rubia cordifolia</i> L. | | 2500 - 3200 | H | Stem and root | It is effective against blood related problems, fever diffused from the kidneys and intestinal fevers. |
| Saxifragaceae | | | | | |
| <i>Bergenia ligulata</i> Haw. Sternb. | Silpayi | 3400 - 4000 | H | Roots and leaves | Used against Asthma, boils, cuts, wounds, burns, fever, liver complaints, ophthalmia, piles, thirst, kidney stones, urine complaints and diarrhoea of cattles. |
| <i>B. stracheyi</i> Hk. & Th. | Silpayi | 3300 - 4000 | H | Rt, Lf | Cures Kidney stone, poultice, stiff joint, diuretic, antiscorbutic, astringent, fever, ophthalmia, tonic, cuts, wounds); Edible. |
| Scrophulariaceae | | | | | |
| <i>Pedicularis bicornuta</i> Klotzsch ex Klotzsch | Lugru serpo | 3500 - 3800 | H | Aerial Part | It is useful in treating liver and gall bladder problems, excessive seminal discharge, oedema and hangover. |

| | | | | | |
|--|--|-------------|---|-----------------|--|
| <i>Picrorhiza kurroa</i> Royle ex Benth. | Karu | 3400 - 4000 | H | Entire herb | It is useful in treating Anemia, arthritis, asthma, bitter tonic, cardiotoxic, cold, dyspepsia, diarrhoea, influenza, diuretic, fever, hepato protective, indigenous system of medicine, jaundice, liver trouble, stomach, laxative, pure circulation blood, neck pain, internal wound, large dose ascarthritic. |
| <i>Verbascum thapsus</i> L. | Kolomasta, Jawarna Loudi, Tombru, Tamaku | 2500 - 3900 | H | Entire herb | It is useful in curing Asthma, cough, diarrhoea, dysentery of sheep, poultice, skin disease, narcotic, fish poisoning, ear infection, dye. |
| Solanaceae | | | | | |
| <i>Hyoscyamus niger</i> L. | Bazerbangh | 2600 - 3630 | H | Entire herb | It subsides pains caused due to pathogen diseases, toothache, pharyngitis and also used in treating malignant ulcers. |
| PTERIDOPHYTES | | | | | |
| Equisetaceae | | | | | |
| <i>Equisetum arvense</i> L. | Khin | 2800 - 3560 | H | Ashes of plants | It acts as Diuretic haemostatic, proper kidney, dropsy gravel affection, acidity, dyspepsia. |

*H-herb; Sh-Shrub; T-Tree.

from 2800 to 3800 m above the mean sea level. It was observed that the developmental activities like; construction of roads, dams and hydropower units had brought rapid change in local environment, old culture, mindset of the native people and also threatened to existing flora and fauna of the valley.

The occurrence of near endemic, endemic, critically endangered, endangered, vulnerable, near threatened and threatened species indicated high anthropogenic pressure and that area has high conservation value. Most of these species are commercially viable. Mass reproduction for ex-situ conservation and to ensure availability of quality planting material for cultivation, together with education and awareness programmes for large-scale cultivation are suggested. The old people still says that the superstition is the best way to conserve this valuable wealth.

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