

**ETHNOMEDICINAL INVENTORY OF FLORA OF MARADORI VALLEY,  
DISTRICT FORWARD KHAHUTA, AZAD KASHMIR, PAKISTAN**

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**ABSTRACT**

Population explosion and trend for modernization of life is main declining cause of traditional knowledge and plant resources, due to their conventional and commercial use demands ex-situ and in-situ conservation. Training of the community regarding collection of medicinal plants and their marketing, bonding scientific approach with cultural belief and rituals is inevitable for survival and propagation of plant biodiversity. In this regard, Maradori Valley (MV), District Khahuta Haveli, Azad Kashmir, Pakistan was selected as case study. Main objectives of this expedition were to prepare a checklist of medicinal, economic and aromatic plants incorporating their occurrence, general distribution and conservation status; to determine traditional uses and pharmaceutical values of each medicinal plant species found in the project area. An ethnomedicinal inventory (EMI) was formulated through open-ended and closed-ended interviews methodology which revealed that 45 plant species are of pertinent significance because they are not only used indigenously but also these MPs are exported to other cities of Pakistan to manufacture drugs. EMI describes prevailing incidence of different diseases by categorization in conjunction with traditional application of MPs in curing ailments in the area. For authenticity and reliability of collected data, Informant Consensus Factor (ICF) and Fidelity Level (FL) of MPs flora were determined. The category “Fever, flu, cough and malaria” had highest ICF value (0.88) followed by “Gastro-intestinal disorders, diarrhea, ulcers” had had ICF values (0.77), ranking at second

position which demonstrates high incidence of these types of diseases in the area. The medicinal plants with high FL values were *Senecio chrysanthernoldes*, *Geranium wallichianum*, *Arnebia bethemii* and *Saussurea costus*. Tribal communities of the area hitherto depend on MPs to cure various diseases. Agricultural expansion, urbanization, overgrazing, unscientific collection methods, unawareness of importance of conservation are major threatening factors for the flora.

**Keywords:** Ethnomedicinal Inventory; Plant conservation; Drug development; Maradori Valley; Farward Khahoota; Azad Kashmir; Informant consensus factor

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## INTRODUCTION

During the last several years ethnobotany has been recognized as a valid dispersion and can play a very important role in the advancement of many aspects of scientific, sociological and historical studies. Ethnobotany (EB) stems from the special meanings that medicinal plants have to people, related to the major contributions that they make to many people's lives in terms of health support, financial income, cultural identity and livelihood security. John Harshburger (1896) was the first scientist who coined the word "ethnobotany", to study how plants are used by indigenous people<sup>1</sup>. It is the relationship between different societies and their environments<sup>2</sup>. It is estimated that 70-80% of people worldwide rely chiefly on traditional, largely herbal medicine to meet their primary healthcare needs<sup>3,4</sup>. It is reported that ± 80 % of the Pakistani population depends on traditional medicine for all of their medicinal uses<sup>5</sup>. Particularly, rural and mountainous dwellers of Pakistan

use plants in many different ways, such as medicine, wood fire, timber wood and fodder for house building <sup>6-9</sup>.

Pie and Mounandhara (1987) reported that 70% of the animals and plants species are located on Himalayan regions which are medicinally very important and 70~80% population of this region depends on traditional medicine for health care <sup>10</sup>. Maradori is integral part district Haveli (Kahuta), Azad Kashmir, Pakistan with diverse and fascinating natural scenic views. MV is crescent shaped valley located ca. 3000 feet above the sea level.

Geographically Maradori Valley (MV) is bounded by Uri city of India and Jharni Brigade Head Quarter of India Eastern and Western side, respectively. While on Southern and Northern of MV is Banaras city and a famous post is Til Patra, respectively. Northern side has its route links to Pakistan while other sides are neighbored by Indian Territory (IT) only. Hence, by strategic point of view it is of paramount significance. Meteorologically, most of the year temperature resides very low, in winter it trickles down even below zero and MV presents a white silk vale vision. MV has more than 4500, 300 households living in scattered villages and ethnically Gujars, Khuwajas are dominated followed by Sardar and Malik casts. For dwellers of Kahuta, MV is summer camp (2<sup>nd</sup> home) and people temporarily migrate to this area with their livestock for ca. 3 months (June, July, August) every year. As MV is home of thick and diverse diversity and it provides source of livelihood and subsistence for the local migrant communities. In summer, people of MV solely rely on Medicinal Plants (MPs) not only for curing themselves but also they use MPs as ethnoveterinary medicines.

Ethnobotanical study is gaining a lion share importance in science community because a global trend for revival of interest in the traditional system of medicine in many countries because botanic drugs have no or less side effects <sup>11, 12</sup>. Concurrently, western medicines are being formulated by isolation of biodynamic and active compounds from MPs; which is main source of new drug discovery for pharmaceutical industry <sup>11, 12</sup>. During summer camp nomads gather many MPs for domestic and commercial use, and many manufacturers solicit them to supply them MPs. Hence, aim of this study was to explore Maradori vale for its ethnobotanical

potential to highlight its medicinal and other ethnic perspectives. Important MPs' data is documented and conservation status of different species is also elaborated with frame lining future study by ethnobotanical, conservation and ethnopharmacology perspectives in MV.

## **METHODOLOGY**

### ***Data Collection:***

The plant survey exploration was planned and trips were conducted with local guides during year 2008. The plant specimens were collected with help of young male nomadic people as area is tough and hard to travel and climb due to its lofty and high mountains. The plants collected were taken to base camp and ethnomedicinal informations were recorded by employing open-ended and closed-ended interviews<sup>12, 13</sup>. The interviewees were both male and female but of old age (45 years). The linguistic barriers were resolved by hiring local translator to interview the people. The plant's vernacular names, their ethnomedicinal use, plant parts used and mode of administration were recorded. Field notes and morphology of each specimen were written during the field trips<sup>12, 13</sup>. The collected specimens were dried, pressed and preserved properly, and herbaria were submitted to Herbarium of Department of Botany, Mirpur University of Science & Technology (MUST), Bhimber Campus (A.K.). The preserved plants were identified with help of Flora of Pakistan<sup>14, 15</sup> and information gathered was crossed matched with available literature for its reliability. For further authenticity data were analyzed and tested by using Informant Consensus Factor (ICF) and Fidelity Level (FL) with Personal Computer<sup>16</sup>.

### ***Data Analysis:***

The reported diseases were grouped into 10 categories based on the information gathered from the interviewees. The categories were: Fever, flu, cough and malaria; bronchitis, cough and throat infection; brain, heart and eyesight, tonic; liver, spleen and kidney disorders; gastro-intestinal disorders, diarrhea, ulcers; diabetics, cancer/tumor; hypotonic, blood clotting and blood purifier; gonorrhea, rheumatism and skin disorders; sexual impotence, menstruation and labor; back pain and joints pain, wound as a plaster. Informant consensus factor (ICF) was calculated

for each category of ailments to identify the agreements of the informants on the reported medicures for the group of ailments. ICF was calculated as follows: number of use citations in each category ( $n_{ur}$ ) minus the number of species used ( $n_t$ ), divided by the number of use citations in each category minus one<sup>17</sup>.

$$ICF = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

The fidelity level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was calculated for the most frequently reported diseases or ailments as:

$$FL (\%) = \frac{N_p}{N} \times 100$$

Where  $N_p$  is the number of informants that claim a use of a plant species to treat a particular disease, and  $N$  is the number of informants that use the plants as a medicine to treat any given disease (Alexiades, 1996). These two methods are helpful in the selection and authenticity of ethnomedicinal knowledge of plants for further studies in pharmaceutical analysis and other research projects.

## RESULTS:

1. Botanical Name: *Artimisa fragrans* Wild

Vernacular name: Chiti boti

Family: Asteraceae

Herbaria No: MUH-01

Use: The extract of leaf called “arq” is used as anthelmenthesis. It is also used to cure tooth and ear pain.

2. Name: *Achilcea millefolium* L.

Vernacular name: Ratti boti

Family: Asteraceae

Herbaria No: MUH-02

Use: The decoction of leaf is effective against fever and it is also used as astringent, tonic, diaphoretic. This plant is called “*healing herb*” predominantly implied for wound, cuts and abrasion.

3. Name: *Aconitum hetrophyllum* Sans.

Vernacular name: Patrees

Family: Ranunculaceae

Herbaria No: MUH-03

Uses: This species is very important plant in the village because it is used against many ailments by the local inhabitants and it named as “*house doctor*”. Tuberos root of the plant are tonic, astringent, stomachic and very frequently used in fever, cough and diarrhea. It power is mixed with milk to cure flu, chest pain, black fever and cough.

4. Name: *Senecio chrysanthernoldes* D. C.

Vernacular name: Bagoo

Family : Asteraceae

Herbaria No: MUH-04

Use: Root of plant is used in liver and stomach disorders. The extract of leaf called “arq” is mixed into water and employed for prompt cure of skin diseases and lung diseases in infants, and it is good reliever against cholera too.

5. Name: *Jurinea dolomiaea* Boiss

Vernacular name: Jhari dhoop

Family : Asteraceae

Herbaria No: MUH-05

Use: A decoction of root is used as cardiac tonic and eruptional. Root powder is very commonly used for treatment of fever.

6. Name: *Taraxacum officinale* Huds.

Vernacular name: Hand

Family: Asteraceae

Herbaria No: MUH-06

Used: Leaves are cooked as vegetable which is tonic lessening of heart pain. Rood decoction is good for curing early level of diabetes. Powder of root taken with goat milk is effective in improvement of digestive system.

7. Name: *Cannabis sativa* L.

Vernacular name: Bahang

Family: Canabaceae

Herbaria No: MUH-07

Use: Whole plant extract is effective cure of livestock dysentery. Cannabis is also used for the treatment of number of condition including: AIDS, multiple sclerosis and thermotherapy induced nausea. Its decoction is used for the treatment of the cancer, neuro protection, fever and high blood pressure. It cause hallucination when drunk in excessive quantity.

8. Name: *Euphorbia heliscopia* Sun (Spurge)

Vernacular name: Hervy

Family: Euphorbiaceae

Herbaria No: MUH-08

Use: Plant is antiseptic. The root powder is used against skin disease.

9. Name: *Geranium wallichianum* D. Don ex Sweet

Vernacular name: Ratin loog

Family: Geraniaceae

Herbaria No: MUH-09

Use: Root is used for the treatment of back pain and joints pain in anno domnie.

10. Name: *Mentha longifolia* (L.) Huds.

Vernacular name: Podina

Family: Lamiaceae

Herbaria No: MUH-10

Uses: The dried plant is use for the treatment of diarrhea and its "*chatenii*" is good tonic for improvement of stomach. The tea of leaf with lemon extract is common household tonic to cure cold, flu, respiratory disorders, cough, and asthma.

11. Name: *Indigofera gerardiana* Jpg

Vern: Kainthi

Family: Papilionaceae

Herbaria No: MUH-11

Use: Root extract is bonafide ethnomedicine in injuries as blood clotting agent. Leaves are anti-allergic and its “Arq” is used to control the skin diseases.

12. Name: *Angelica glauca* Edgew

Vernacular name: Marchar

Family: Apiaceae

Herbaria No: MUH-12

Uses: Plant is used for the treatment of several diseases: asthma, arthritis and cold. The root is frequently used as herbal medicine by “hakeems” against cancer/tumor.

13. Name: *Ajuga bracteosa* Wall ex Benth.

Vernacular name: Rati buti

Family: Labiateae

Herbaria No: MUH-13

Uses: Plant is effective in stomach disorders and chest burn cases. Its root powder is good remedy for diarrhea and dysentery. Dried leaves are ground and pressed as pills of “quinine” to cure malaria and typhoid.

14. Name: *Arnebia bethemii* (Wall. ex G.Don.) Johnst

Vernacular name: Ghaozban

Family: Boraginaceae

Herbaria No: MUH-14

Uses: Tea prepared from root is used to cure pneumonia and flu. It is also used for the treatment of tongue and throat diseases. It is a villager’s common tonic for cardiac troubles.

15. Name: *Actonium chasmenthium* Stapf.

Vernacular name: Mori

Family: Ranunculaceae

Herbaria No: MUH-15

Uses: The plant widely used to cure different diseases: diuretic, ant-diabetic, fever and heart disease. It is thought to be antidote against snake and scorpion sting.

16. Name: *Achillea millefolium* L.



Vernacular name: Sultani Booti

Family: Asteraceae

Herbaria No: MUH-16

Uses: The decoction of flower in milk is laxative, diuretic, stimulant. It is good tonic for brain and heart. It is predominantly applied in many ethnomedicines by local herbalist for growth and development of feministic secondary organs. The herb is mostly used as blood purifier with *Melia azadarch*.

17. Name: *Senecio chrysanthemoides* D C.

Vernacular name Chahl

Family: Asteraceae

Herbaria No: MUH-17

Uses: Aqueous leaf extract is used as antipyretic and calmative. The root decoction household is common recipe for children to guard against cholera and chest diseases.

18. Name: *Saussurea lappa* (Falc.) Lipsch.

Vernacular name: Kutth

Family: Asteraceae

Herbaria No: MUH-18

Uses: It is among the most medicinal species in the area. The oil shows antiseptic and disinfectant properties. It is cardiac stimulant, carminative, expectorant and diuretic. The alkaloid has a remarkable effect in controlling attacks of bronchial asthma. Due to this reason it is subjected to illegal uprooting and exported unlawfully on mass basis which is threat for this plant in the area.

19. Name: *Impatiens edgeworthii* Hook.

Vernacular name: Buntil

Family: Balsaminaceae

Herbaria No: MUH-18

Uses: The extract of plant is internally used for gonorrhoea and externally employed on burns.

20. Name: *Impatiens glandulifera* Royle

Vernacular name: Buntil

Family: Balsaminaceae

Herbaria No: MUH-20

Uses: The flower juice is used as cooling agent and tonic. The peoples apply the crushed leaves on burnt parts on body as “*first aid medicine*” in the village. Plant is also used in joint pain. When it is raw eaten, it acts as an emetic, cathartic and diuretic.

21. Name: *Berberis lycium* Royle

Vernacular name: Sumbhu

Family: Berberidaceae

Herbaria No: MUH-21

Uses: Root decoction used in splenic trouble, it is good tonic for intestinal disorders. Its extract is very effective in cough, chest and throat troubles. It is traditional tonic used for diabetic treatment and it is also good medicine in boils and pimples.

22. Name: *Viburnum cotinifolium* D. Don

Vernacular name: Guch

Family: Caprifoliaceae

Herbaria No: MUH-22

Uses: Fruit is employed as laxative and blood purifier. Leaves' extract is commonly applied in menorrhagia.

23. Name: *Swertia petiolata* D. Don

Vernacular name: Chirayetta

Family: Gentianaceae

Herbaria No: MUH-23

Uses: The root of plant is bitter and household tonic for cooling, anthelmintic, antipyretic, antiperiodic and laxative. The decoction of plant cures leucoderma, inflammations, pain in the body, urinary discharges, ulcers, asthma. The powder of plant is effective remedy for bronchitis, leucorrhoea, piles, bad taste in the mouth, vomiting in pregnancy.

24. Name: *Geranium wallichianum* D. Don ex Sweet

Vernacular name: Rattenjot

Family: Geraniaceae

Herbaria No: MUH-24

Uses: Floral extract is used for vision problem and blood purification. Root powder with *Daucus carota* is also used for jaundice, kidney and spleen problems.

25. Name: *Nepeta laevigata* (D. Don) Hand-Mazz.

Vernacular name: Muskbal

Family: Lamiaceae

Herbaria No: MUH-25

Uses: The seeds of the plant are infused in cold water and are used traditional remedy in dysentery.

26. Name: *Aconogoum alpinum* Schur.

Vernacular name: Maslon

Family: Polygonaceae

Herbaria No: MUH-26

Uses: The seeds are used as emetic and purgative. The infusion of seed has been found to be very effective in diarrhea and children summer complaints. The decoction (Sherbat) is prepared from inflorescence for fever and menstruation disorders.

27. Name: *Bistorta amplexicaulis* (D. Don) Greene

Vernacular name: Maslooni

Family: Polygonaceae

Herbaria No: MUH-27

Uses: The plant is used for preparation of domestic tea which is very effective and frequently used in flu, fever and joints pain.

28. Name: *Fragaria nubicola* Lindl. ex Lacaite

Vernacular name: Budmewa

Family: Rosaceae

Herbaria No: MUH-28

Uses: The fruit is edible and is used by inhabitants as laxative and purgative.

29. Name: *Potentilla nepalensis* Hook.

Vernacular name: Rattenjot

Family: Rosaceae

Herbaria No: MUH-29

Uses: The root extract is considered depurative and its powder (ashes) is being applied with oil to burns and bruises.

30. Name: *Rosa macrophylla* Lindley

Vernacular name: Jangli Gulab

Family: Rosaceae

Herbaria No: MUH-30

Uses: Flowers are used for fragrance production. Its floral leaves mixed with sugar (gulkand) are household tonic for stomach disorders.

31. Name: *Urtica dioica* L.

Vernacular name: Kayyari

Family: *Urticaceae*

Herbaria No: MUH-31

Uses: It is allergenic plant. Leaves if touched with body cause severe irritation and itching swelling of skin that can be soothed by rubbing the leaves of *Rumex nepalensis* on effected parts.

32. Name: *Viola odorata* L.

Vernacular name: Banafsha

Family: Violaceae

Herbaria No: MUH-32

Uses: Plant is used to cure malaria, bronchitis and asthma. The root is purgative, tonic, expectorant and diuretic. The oil relieves abdominal pain, cough and it is hypotonic and sedative.

33. Name: *Artemisia annua* L.

Vernacular name: Sweet Wormwood

Family: Asteraceae

Herbaria No: MUH-33

Uses: Root extract is used to kill intestinal parasites. It is commonly used in tropical as antimalarials ethnomedicine. The efficacy of tea of *A. annua* to cure malaria is commonly found in the area. Plant extract is also used effectively in tumor or cancer suppression. It is said to have partial and selectively toxic ability to hinder growth of breast and prostate cancer cells.

34. Name: *Micromeria biflora* Buch -Hami ex D Don

Vernacular name: Lemon Scented Thyme

Family: Lamiaceae

Herbaria No: MUH-34

Uses: Its essential oil of leaf is used for flavoring liqueurs. Root decoction is used for abdominal distension, dysentery, colds and coughs.

35. Name: *Oenothera rosea* L.

Vernacular name: Jungli gulab.

Family: Onagraceae

Herbaria No: MUH-35

Uses: Young roots are eaten like a vegetable (with a peppery flavor), or the shoots can be eaten as a salad. The whole plant was used to prepare an infusion with astringent and sedative properties. It is considered to be effective in healing asthmatic coughs, gastro-intestinal disorders and whooping cough .

36. Name: *Bergenia ciliata* (Haw.) Stern

Vernacular name: Pakhanbed

Family: Saxifragaceae

Herbaria No: MUH-36

Uses: The root is used as a tonic in the treatment of fevers, diarrhea and pulmonary affections. The powder of the whole plant is used to treat urinary troubles and anti-calculi for the kidneys.

37. Name: *Trifolium repens* L.

Vernacular name: White clover

Family: Fabaceae

Herbaria No: MUH-37

Uses: The infusion of the plant is applied to treat fever and bright's disease. The natives use the root decoction to cure cough and cold.

38. Name: *Polystachum braunii* (Spenner) Fée

Vernacular name: Holly Fern

Family: Dryopteridaceae

Herbaria No: MUH-38

Uses: A tea of root is known for blood purifier, emetic and febrifuge. Its decoction is used in the treatment of chills, fevers, pneumonia, stomach or bowel complaints and rheumatism. A decoction of the root in *Olea* sp. oil has been massaged in rheumatism. The powdered root is inhaled and then coughed up in order to restore the voice.

39. Botanical name: *Conyza canadensis* (L.) Cronquist.

Vernacular name: Malooch

Family: Asteraceae

Herbaria No: MUH-39

Use: Fresh root is stimulant, homeostatic and diuretic. It is used in diarrhea and dysentery.

40. Name: *Bupleurum longicaule* Wall ex D C.

Vernacular name: Proshi

Family: Apiaceae

Herbaria No: MUH-40

Uses: The root in combination with other drugs is prescribed in liver troubles and as a diaphoretic. It is also effective in thoracic and abdominal inflammation and fever. It is used as antifatulent agent. It is used as tonic in folklore recopies to cure malaria and other fevers.

41. Name: *Rheum emodi* D C.

Vernacular name: Chutial/ Rhubarb

Family: Polygonaceae

Herbaria No: MUH-41

Uses: The root powder is used as purgative, astringent and tonic in dyspepsia. The tuber is effective in biliousness, sore eyes and fever. It is also used as blood purifier and color whitener. Its decoction is used to reduce excessive acidity in children.

42. Name: *Impatiens balsamina* L.

Vernacular name: Rose Balsam

Family: Balsaminaceae

Herbaria No: MUH-42

Uses: The plant extract is cathartic, diuretic and emetic. It is used in the treatment of joints pain. The leaf juice is used as a treatment against warts. The seed powder with *Papaver somnifera* latex and butter of cow is domestically given to pregnant women during labour.

43. Name: *Saussurea costus* (Falc.) Lipsch.

Vernacular name: Minyal, Kuth

Family: Asteraceae

Herbaria No: MUH-43

Uses: It is used to treat pains especially arthritis. It is good ethnomedicine for annomnie pain of knees.

44. Name: *Anaphalis nepalensis* (Spreng.) Hand.-Mazz

Vernacular name: Chikee

Family: Asteraceae

Herbaria No: MUH-44

Uses: The herb is aromatic and used in homes for their beautiful smell. It is good tonic for headache and dizziness.

45. Name: *Prunella vulgaris* L.

Vernacular name: Ustukhdoos

Family: Lamiaceae

Herbaria No: MUH-45

Uses: The seeds are antipyretic, laxative, tonic and diuretic. The extract of plant is used in inflammation, breathing disorders and weakness of eyesight due to over age. It is commonly used by tribes as expectorant and antispasmodic. The plant is used for fever and cough. It is good tonic for enlarged heart and other cardio vascular diseases.

## DISCUSSION:

The science of ethnobotany is as old as human civilization. Ethnobotanical knowledge is providing great contribution not only in preservation of culture and traditions of an area but also it provides many clues and incentives for Phytochemical Research (PR) to discover many novel drugs<sup>5, 8</sup>. It is centuries old practice to extract

and process the medicinal plants for local economic uplift, daily human use and for animal treatment<sup>18, 19</sup>. Medicinal plants continue to be extensively used as a major source of drugs for the treatment of many ailments and as such their procurement, cultivation and propagation is of great importance.

Pakistan has a diverse flora containing about 6000 species of plant life. Estimates indicate that around 700 plant species are used as medicinal and aromatic plants<sup>20</sup> (Pei, 1992). In Pakistan 80% of the people belonging to the rural areas still depends upon the herbal medicines. In the recent years, more efforts have been made to document the traditional knowledge about local medicinal flora<sup>21</sup>. Herbal medicines are getting revival in western societies, along with their complimentary pharmacological therapies such as Traditional Chinese Medicines (TCMs), Osteopathy, Homoeopathy and other Hikmat therapies.

In the study area (MV), ca. 80% of the local dwellers (mainly children, women) and concurrently nomad tribes are engaged in collection and processing of different MPs. These collectors are much ignorant about the proper time of collection, processing, storing and marketing techniques. Their mishandling with plants causes much loss to these natural resource and as well as to whole biodiversity. These MPs, when used medicinally, have synergy and harmony within the human body due to the combinations and interactions of the chemical constituents they contain. Moreover, proper timing of collection of desired part of a plant generally determines the yield percentage, quality and harmony of ingredients<sup>22</sup>.

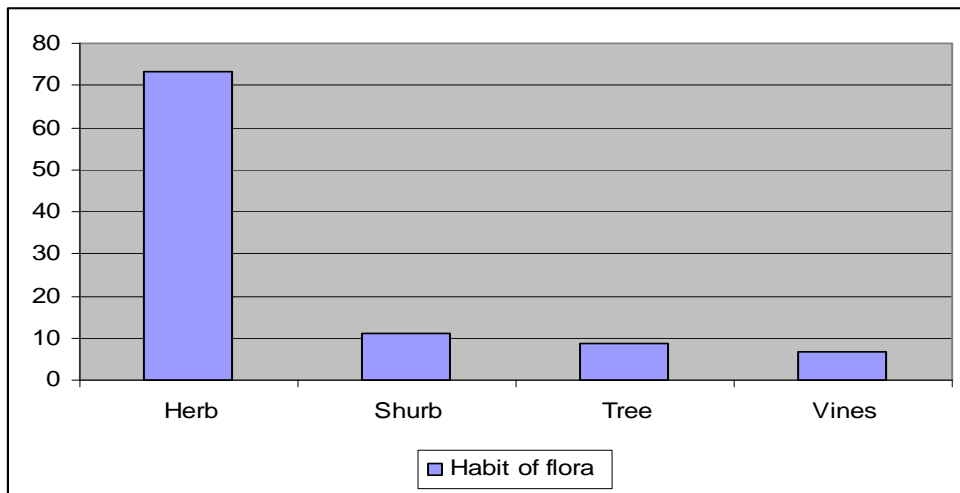
It is demonstrated by the analysis that more frequently plants used as ethnomedicines belong to the class herb (52.77%) as shown in Fig. 1. EMI analysis predicts that 45 MPs are used in different ethnomedicines belong to 34 families and highest number of MPs belong to family Asteraceae, followed by Polygonaceae, Lamiaceae and Caprifoliaceae (Table 1), that may be due to prevailing occurrence of plants of Asteraceae. The EMI demonstrates that herbs are most frequent collected and used (73%) in ethnomedicines (Fig. 1) as these are easier to collect, dry and process<sup>7</sup>. In preparation of botanic drugs, local communities mostly use whole herb, root and leafy material (Fig. 2) that may be due to their frequently availability, presence of more active constituents and easiness to collect from the forest<sup>7</sup>. There



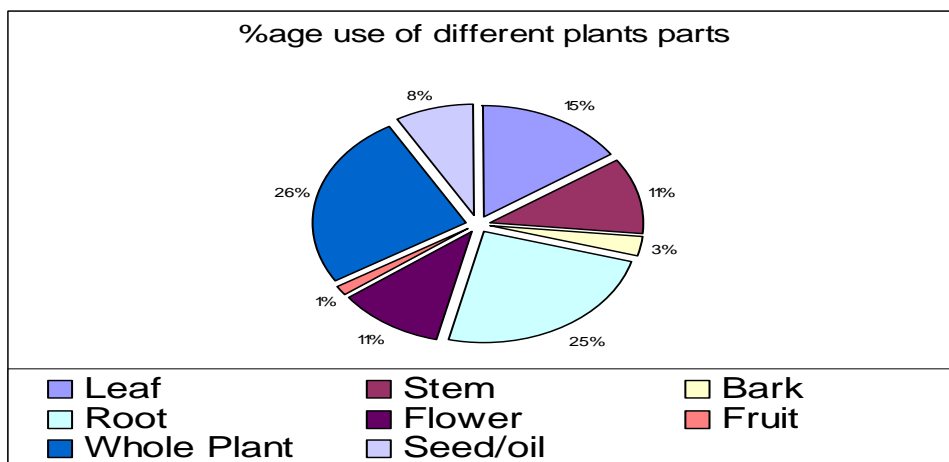
are different methods and modes of preparation and their usage but mostly extract or tea (40%) and decoction (31%) of MPs was used as ethnomedicines that may be due to easy to prepare extract or decoction from the herbs and their liquid form make it favorable for intake by patients (Fig. 3) <sup>7, 12</sup>.

**Table 1. Family Index (with highest number of species used) in the study area (Maradori)**

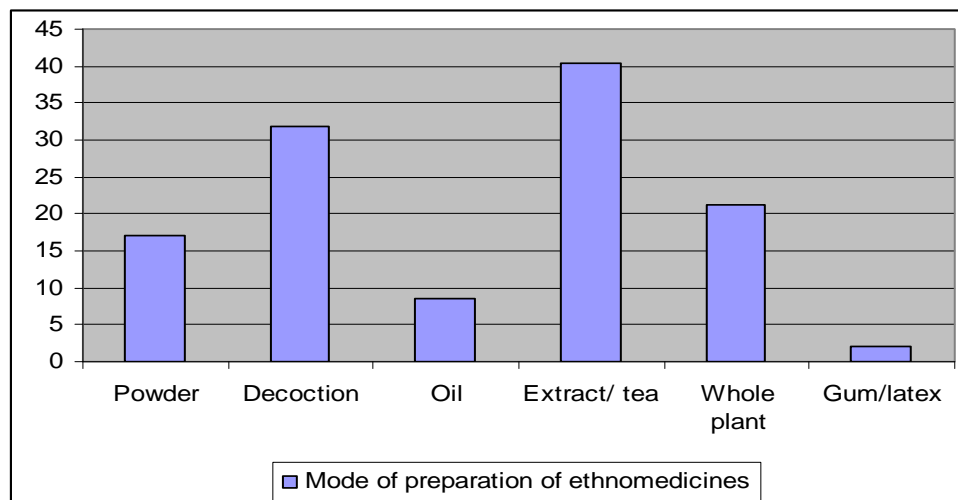
S/N	Family	No of Species	Ranking
1	Asteraceae	12	1 <sup>st</sup>
2	Polygonaceae	5	2 <sup>nd</sup>
3	Lamiaceae	3	3 <sup>rd</sup>
4	Caprifoliaceae	2	4 <sup>th</sup>
5	Geraniaceae	2	4 <sup>th</sup>
6	Ranunculaceae	2	4 <sup>th</sup>



**Fig. 1. %age of different habits of plants used in ethnomedicines**



**Fig.2. %age of plant parts used in ethnomedicines**



**Fig. 3. %age of mode of use of plants as ethnomedicines**

In the present study it is known *Artimisa fragrans* is called “HOME DOCTOR” because it is very commonly used as first treatment step at home in many diseases; it is used for curing fever, tooth pain, wound, cuts and abrasion. This herb is very medicinal and used against many other disorders including astringent, tonic, diaphoretic<sup>23</sup>. *Cannabis sativa* is used to treat multiple sclerosis and thermotherapy induced nausea, tumors, high blood pressure, fever and mental disorders<sup>24, 25</sup>. Another herb *Ajuga bracteosa* is common in folklore recipes to cure jaundice and in enlargement of liver and spleen. It is also considered effective in diabetics, digestive system disorder and for chest burn<sup>26</sup>. Extract of this herb is considered very effective in malaria as may be some of its bio-constituents have activity against malarial germs<sup>27</sup>. The herb *Polystachum braunii* is used in curing chills, fevers, pneumonia, stomach or bowel complaints and rheumatism, and its root decoction is used to massage the pain joints<sup>28</sup>. The root of *Berberis lycium* is frequently employed to cure diabetes and splenic troubles by inhabitants of the area. The women of the region use the extract of *Swertia petiolata* in treating leucoderma and to prevent vomiting of pregnancy. The extract of *Artemisia annua* and *Angelica glavaca* is used in folklore medicines for treatment of cancer and other tumors. *Arnebia bethemii* is used to cure pneumonia, cardiac, tongue and throat disorders<sup>29</sup>.

A statistical analysis was conducted by using Informants consensus Factor (ICF) and Fidelity Level (FL) to prove authenticity of ethnobotanical data. MPs that

have higher ICF values are mostly used to treat diverse form of diseases by a huge mass of people. The data in Table 2 demonstrates that disease categories with relatively higher ICF values are: Fever, flu, cough and malaria (0.88), Gastro-intestinal disorders, diarrhea, ulcers (0.77), Bronchitis, cough and throat infection (0.76) and Brain, heart and eyesight, tonic (0.75). This probably indicates high occurrence ration of these types of diseases in this mountainous region complimentarily bounded with poor socio-economic and sanitary conditions of the people due to illiteracy and low level development infrastructure. Another cause of high incidence level of these ailments may be due to reason that people mainly relay on local healers and due to cultural constraints, and they don't prefer to use western medicines. The health problems such as back pain and joints pain (0.46), diabetics and cancer/tumor (0.25) predict low ICF (Table 2). The rare incidence of diabetics, blood pressure and cancer/tumor might be correlated to hard and tough lifestyle of villagers that keeps them away from such diseases; hence these ailments show lower ICF. The MPs which are singly used as ethnomedicine for a single ailment predict higher fidelity level (FL) 100%. For example *Senecio chrysanthernoldes* and *Saussurea costus* are used to cure liver disorders and arthritis, respectively with FL 100% (Table 3). The herbs are used as multiple or admixture therapies with other herbs and/ or used to treat more than one type of ailments demonstrate lower FL. Such as *Prunella vulgaris* is used to cure inflammation, cardiovascular disorders, breathing problems and weakness of eyesight has lower FL (40%) while *Cannabis sativa* is used to treat AIDS, multiple sclerosis, cancer, neuro-protection, fever and high blood pressure and this indicates 24% FL (Table 3).

**Table 2. Informant Consensus Factor by categories of diseases in the study area (Maradori)**

S/N	Category	Species	(%) All species	All Use citations	(%) All citations	ICF
1	Fever, flu, cough and malaria	6	5.35%	45	13.27%	0.88
2	Gastro-intestinal disorders, diarrhea, ulcers	21	18.75%	88	25.95%	0.77
3	Bronchitis, cough and throat infection	13	11.60%	52	15.33%	0.76
4	Brain, heart and eyesight, tonic	6	5.35%	21	6.19%	0.75
5	Liver, spleen and kidney disorders	17	15.17%	45	13.27%	0.63
6	Hypotonic, blood clotting and blood purifier	8	7.14%	18	5.30%	0.58
7	Gonorrhea, rheumatism and skin disorders	21	18.75%	39	11.50%	0.47
8	Sexual impotence, menstruation and labor;	8	7.14%	12	3.53%	0.36
9	Back pain and joints pain, wound as a plaster	8	7.14%	14	4.12%	0.46
10	Diabetics, cancer/tumor	4	3.57%	5	1.47%	0.25

Table 3. FL values of medicinal plants in the study area (Maradori)

S/N	Species and Family	Local name	Therapeutic uses	Fidelity level (FL)
1	<i>Senecio chrysanthernoldes</i> D.C. Asteraceae	Bagoo	Liver disorders	100 %
2	<i>Geranium wallichianum</i> D.Don ex Sweet, Geraniaceae	Ratin loog	Backbone and joints pain	100%
3	<i>Arnebia bethemii</i> (Wall. ex G.Don.) Johnst, Boraginaceae	Ghazban	Pneumonia	100%
4	<i>Saussurea costus</i> (Falc.) Lipsch., Asteraceae	Minyal, Kuth	Arthritis.	100%
5	<i>Mimordica charantia</i> . L. Cucurbitaceae	Karela	Diabetics, Stomachache	85%
6	<i>Angelica glauca</i> Edgew, Apiaceae	Marchar	Asthma, arthritis, cancer	80%
7	<i>Berberis lycium</i> Royle, Berberidaceae	Sumblu	Diabetic, splenic trouble,	70%
8	<i>Geranium wallichianum</i> D. Don ex Sweet, Geraniaceae	Rattenjot	Jaundice, kidney and spleen problems	64%
9	<i>Artemisia annua</i> L., Asteraceae	Sweet Wormwood	Malaria, cancer,	57%
10	<i>Polystachum braunii</i> (Spenner) Fée, Dryopteridaceae	Holly Fern	fevers, pneumonia, stomach, rheumatism.	51%
11	<i>Bupleurum longicaule</i> Wall ex DC. Apiaceae	Proshi	liver troubles, thoracic and abdominal inflammation and fever	46%
12	<i>Prunella vulgaris</i> L., Lamiaceae	Ustukhdoos	inflammation, in diseases of heart, difficult breathing, and weakness of eyesight	40%
13	<i>Cannabis sativa</i> L. Canabaceae	Bhang	AIDS, multiple sclerosis, cancer, neuro protection, fever and high blood pressure.	24%

MPs are extensively used in pharmacological therapies and livelihood practices by local communities, causing a heavy biotic pressure on the plant diversity the area. Many other anthropological activities like deforestation; overgrazing, overexploitation and smuggling are proliferating agents leading threat to plant biodiversity, which may cause loss of MPs by gradual thrilling into threatened or rare category and eventually may become extinct. Furthermore, unscientific and unsustainable approaches are implied to collect the MPs for various purposes which is other cause of plant diversity loss from the area. In the research, a priority ranking (PR) was conducted to know severity of different threatening factors on the flora. It

was concluded by PR that in MV; agricultural expansion, urbanization, timber mafia (for construction) were major factors which are impounding deleterious impacts on the vegetation of the area which coincides with other areas of Azad Kashmir (Table 4)<sup>7, 12</sup>. There is dare need of hour to protect, preserve and conserve plant diversity on priority basis for sustainable generation of life saving herbs and livelihood enhancing species.

**Table 4. Priority Ranking (PR) of factors perceived as threats to medicinal plants based on their level of destructive effects in the study area, (Maradori) (values 1-6 were given: 1 is the least destructive threat and value 6 is the most destructive threat)**

Factors	Respondents (R1-R6)						Total	Percent	Rank
	R1	R2	R3	R4	R5	R6			
Construction	4	5	7	5	4	4	29	15.42	3 <sup>rd</sup>
Grazing	2	3	5	4	6	5	25	13.29	5 <sup>th</sup>
Drought	6	3	2	3	4	5	23	12.23	6 <sup>th</sup>
Agriculture expansion	9	7	6	9	8	5	44	23.40	1 <sup>st</sup>
Fire wood	6	4	3	5	4	6	28	14.89	4 <sup>th</sup>
Urbanization	8	8	5	6	5	9	41	21.80	2 <sup>nd</sup>

This research will shed many long-lasting affects on further ethnobotanical, pharmaceutical, phytochemical, forest management and nature conservation studies and projects because it will provide base line informations for each discipline to develop and launch various sustainable biodiversity conservation projects at government and NGOs level. Moreover, this EMI will be helpful for forest department, agriculture department, archaeological department and environment department, and NGOs in policy formulations for further necessary plans and actions to preserve culture with natural biodiversity and conserve the plant diversity wealth of the planet for future propagation and prosperity of future generations.

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