Evaluating the conservation value and medicinal potential of wild herbaceous flora in the Sanghar Mountains of District Bhimber, Azad Jammu and Kashmir Pakistan

Humaira Khanum, Muhammad Ishtiaq, Mehwish Maqbool, Iqbal Hussain, Khizar Hayat Bhatti, Muhammad Waqas Mazhar, and Alia Gul

Correspondence
Humaira Khanum[1], Muhammad Ishtiaq[1,2]*, Mehwish Maqbool[1,2], Iqbal Hussain[3], Khizar Hayat Bhatti[4], Muhammad Waqas Mazhar[1], Alia Gul[5]

[1] Department of Botany, Mirpur University of Science & Technology (MUST), Mirpur-10250 (AJK), Pakistan
[2] Department of Botany, Climate Change Research Centre, Herbarium and Biodiversity Conservation Laboratory, Azad Jammu and Kashmir University of Bhimber (AJKUoB), Bhimber-10040, AJK, Pakistan
[3] Department of Botany, Government College University Faisalabad, Pakistan
[4] Department of Botany, University of Gujrat, Pakistan
[5] Department of Botany, Hazara University, Hazara KPK, Pakistan

*Corresponding Author: drishtiaq.bot@must.edu.pk

Ethnobotany Research and Applications 27:6 (2024) - http://dx.doi.org/10.32859/era.27.6.1-41
Manuscript received: 26/11/2023 - Revised manuscript received: 27/03/2024 - Published: 28/03/2024

Research

Abstract

Background: The current research aimed to explore the conservation status, ethnobotanical and traditional ethnomedicinal uses of wild flora in the Sanghar mountains of District Bhimber, Pakistan, with a focus on discovering novelty and potential drugs.

Methods: This study was conducted in 2018-19 and involved interactions with indigenous communities, with informants ranging in age from 40 to 100 years. Open-ended and closed-ended interview protocols were employed to gather information. Conservation status was determined using a semi-structured questionnaire covering anthropology.

Results: Among the 248 plant species studied, 47 were trees, 42 were shrubs, and 159 were herbs, all of which were utilized in traditional ecological medicines and ethnobotany. Out of the 248 plant species, 120 (48.38%) were annual, 6 (2.44%) were biennial, and 122 (49.18%) were perennial plants. Poaceae and Asteraceae stood out as the most prevalent families in the region, with 33 and 14 plant species respectively. These plants served various purposes, with 30% utilized as fodder, 24% as fuel sources, and smaller percentages employed for ethnoveterinary medicines, home construction, cosmetics, and honeybee cultivation. The traditional applications of these plants encompassed the treatment of a wide range of ailments, including fever, cough, jaundice, skin diseases, diabetes, snake bites, and dental issues. Among the 248 plant species studied, 4.64% were dominant, 5.24% endangered, 43.54% vulnerable, 38.70% rarely distributed, and 6.85% infrequent, indicating the urgent need for focused conservation efforts.

Conclusion: The research underscores the potential for drug discovery within traditional ethnomedicinal practices, emphasizing the conservation of the flora from the study area.

Keywords: Ethnobotany, plant biodiversity, medicinal plants, botanical composition, drug discovery

Background

Plants are universal being used in multifarious forms by human being in different areas of the world. Plants are used for coping needs of life and to cure various infirmities. Drug discovery involves finding new drugs to treat diseases. Drug discovery can be a long and expensive process, but it is often worth the effort, as new drugs can save lives and improve the quality of life. The drug discovery potential depends on the ethnomedicine knowledge possessed by the indigenous communities of an area. Ethnobotanical knowledge is the cumulative body of knowledge, skills, and practices that indigenous peoples and local communities have developed over time to sustainably manage their environment and use its resources (Hameed *et al.* 2012; Rahim *et al.* 2023). This includes knowledge of plants, animals, fungi, and other organisms, as well as knowledge of the environment, such as climate, soils, and hydrology. This knowledge is often passed down from generation to generation through oral tradition, and it can be a valuable resource for scientists and conservationists. Wild plants have been a valuable source of medicine for centuries, harnessing the power of nature to heal various ailments. These untamed botanical treasures offer a diverse array of healing properties, each adapted to survive and thrive in their specific environments. From dense forests to arid deserts, wild plants have adapted to develop potent compounds that can soothe, alleviate, and even cure a wide range of health conditions. Traditional knowledge passed down through generations has helped unlock the secrets of these natural remedies, revealing their potential to treat everything from common colds to more complex diseases. WIPs are plants that grow naturally in the wild and have not been domesticated or cultivated (Ahmad *et al.* 2011; Gillani *et al*. 2024). They are often used in traditional medicines, and some have been shown to have scientific evidence of medicinal efficacy.

Herbal flora can include both wild and cultivated plants, and it can vary from region to region. In some regions, herbal flora is an important source of medicine, and it is often used to treat a variety of ailments, such as colds, flu, and headaches. Ethnobotanical knowledge is important for a number of reasons. First, it can provide information about the medicinal potential of plants (Hameed *et al.* 2012; Ahmad *et al.* 2011). Second, it can help to conserve plant diversity. Third, it can help to improve the health of indigenous communities. Wild indigenous plants have a long history of use in traditional medicine. Many of these plants have been shown to have scientific evidence of medicinal efficacy. For example, the plant *Rauwolfia serpentina*, which is found in India, is used to treat hypertension (Ishtiaq *et al.* 2021). The plant *Artemisia annua*, which is found in China, is used to treat malaria. Plant diversity is important for a number of reasons. First, it provides a variety of plants that can be used for food, medicine, and other purposes. Second, it helps to maintain healthy ecosystems. Third, it provides a source of genetic diversity, which can be used to develop new crops and medicines. Indigenous communities often have a high reliance on traditional medicine. This is because traditional medicine is often more affordable and accessible than modern medicine. In addition, traditional medicine is often better suited to the needs of indigenous communities, as it takes into account the cultural and environmental context (Ishtiaq *et al.* 2006; Kayani *et al*. 2024).

Azad Jammu and Kashmir (AJK) has a unique administrative status within Pakistan. It is a self-governing administrative region, also referred to as "Azad" meaning "Free" in Urdu. The region has its own elected President, Prime Minister, and a bicameral legislative assembly. However, Pakistan is responsible for the defence and foreign affairs of AJK. The region has indigenous communities having close interaction with the native plants for their medicinal significance. District Bhimber is located in the north-western Himalayas and has a diverse range of vegetation, including forests, grasslands, and deserts. The Sanghar Mountain Range (SMR) is a mountain range that runs along the northern edge of the Indian subcontinent (Ishtiaq *et al.* 2006). The range is located in the north-western Himalayas and is home to a diverse range of vegetation, including forests, grasslands, and deserts. The region is also home to a number of indigenous communities who have a long history of using plants for medicinal purposes. The region is commonly referred to as the "Gateway to Kashmir (Bab-e-Kashmir)," as it served as the entry point for Mughal emperors and warriors traveling to the Kashmir valley and the subcontinent (Mughal, 2016).
The need for this study originates from the rich biodiversity of the Sanghar mountainous region (SMR), which remains largely untapped despite its vast potential. The inhabitants of this area rely heavily on the natural resources offered by its wild plants and fauna for their daily sustenance. Recognizing the importance of preserving the traditional culture and knowledge of the diverse ethnic tribes living in this region, this study was undertaken with the primary aim of documenting and safeguarding their heritage. Additionally, the study aims to explore the potential novel medicinal uses of the area's botanical resources, contributing to the broader understanding of ethnobotany in the region.

Ethnobotanical practices have been a longstanding tradition among the indigenous peoples of Azad Jammu and Kashmir (AJK), with numerous studies documenting the use of medicinal flora across various localities. For instance, Gillani et al. (2024) highlighted the aromatic and medicinal plants found in the Kashmir Himalayan region of AJK, while Mirzaman et al. (2023) explored the cultural knowledge of plants in the Makra Hills of Muzaffarabad, AJK, Pakistan. However, the Sanghar mountainous region of AJK remains relatively underexplored in terms of ethnobotanical research. Hence, this study aims to contribute to the existing literature by shedding light on the ethnobotany of AJK, Pakistan, particularly in the Sanghar region. The research had several primary objectives, including documenting the wide variety of wild herbal flora in the Sanghar mountainous region (SMR) and their traditional ethnobotanical knowledge, evaluating the conservation status of the herbal flora in SMR, and collecting information on important traditional ethnomedicine (TEMs) and organizing their botanical formulations. By doing so, the research aims to contribute to the existing literature on ethnobotany in AJK, particularly in the Sanghar region, and potentially enhance the integration of traditional medicinal knowledge into modern healthcare systems.

Material and Methods

Study Area

The Sanghar mountain range (SMR), also known as the Sanghar or Lower Himalayas, plays a significant role in shaping the climate and environment of Bhimber district in AJK, Pakistan (Figure1 and 1S). The region experiences a subtropical or temperate climate with distinct seasons. During the summer months (May to August), temperatures can soar, with average highs ranging from 30°C to 40°C (86°F to 104°F). In contrast, winters (December to February) can be relatively cold, with average lows ranging from 2°C to 10°C (36°F to 50°F). The area is strongly influenced by the monsoon season, which lasts from July to September, and during this period, the region receives the majority of its annual rainfall (Ishtiaq *et al.* 2016; Ishtiaq *et al.* 2012).

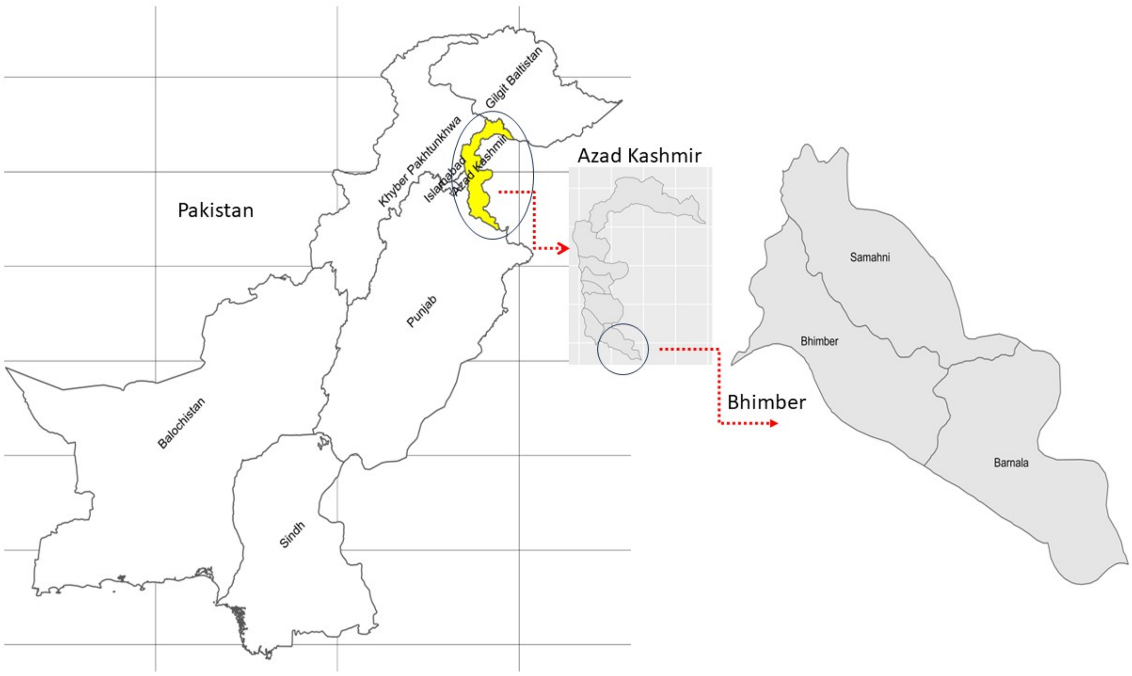

Figure 1. Map of Pakistan highlighting Azad Jammu and Kashmir, including its extension into the Bhimber district

The average annual precipitation can range from 800 mm to 1200 mm, contributing to the lush greenery and vegetation in the area. Humidity levels tend to be relatively high during the monsoon months but moderate during the rest of the year. The weather in the SMR and Bhimber district varies significantly throughout the year. Summers are generally hot and dry, while the monsoon season brings heavy rainfall and occasional thunderstorms. Winters are cooler, and higher elevations in the mountains may experience occasional snowfall. The soil in the region is diverse, with variations depending on factors such as altitude, slope, and vegetation cover. In the lower regions, the soil is often alluvial and fertile, making it suitable for agricultural activities. As one moves higher up the mountains, the soil may transition to rockier and stony terrain (Ishtiaq *et al.* 2021; Gillani *et al.* 2024).

Ethnic Groups

The district of Bhimber in AJK, Pakistan, is a melting pot of diverse ethnic groups, each contributing to the region's cultural richness and heritage. Among the major ethnic communities found in Bhimber are the Pahari/Pothwari people, who have their roots in the Pothohar Plateau and speak the Pothwari language. The Gujjar community, known for their traditional pastoral lifestyle, is also prominent in the region. The Mirpuri people, with their distinct language, originate from the nearby Mirpur district and have a strong presence both locally and within the diaspora communities in the United Kingdom. The Jat community, primarily engaged in agriculture, and the Kashmiri people, who share a cultural tie to the wider Kashmir region, are also significant in the area. The Rajput community, known for their warrior traditions, further enriches the diverse ethnic landscape of Bhimber. Alongside these major groups, there are smaller minority communities that add to the cultural tapestry of the district. This vibrant mix of ethnicities shapes the traditions, festivals, and social fabric of Bhimber, making it a unique and culturally diverse part of AJK (Gillani *et al*. 2024; Manzoor *et al.* 2023).

Data collection protocols

The data collection process was carried out using semi-structured and structured interview protocols, adhering to devised procedures that involved questionnaires and field plant interviews (Ishtiaq *et al.* 2013). To ensure comprehensive data gathering, planned field trips were organized to visit the study area in the SMR of Bhimber. Assistance from a female guide or translator was sought to facilitate data collection from female communities residing in the villages, as their traditional knowledge about herbal flora was crucial to the study. The interviewees represented a diverse range of professions and age groups, spanning from 35 to 105 years, with the majority being peasants and woodcutters, who held valuable insights into the local plant uses (Kousar *et al*. 2023).

Ethnobotanical knowledge related to the quantities, resources, and utilization of herbal plants was documented using a questionnaire method during the interviews. Various individuals, including farmers, elderly people (often over 70 years old), drug dealers, hakims (traditional healers), and shopkeepers, were interviewed to gather compehensive information about the local flora and its applications (Kayani *et al.* 2024; Ishtiaq *et al.* 2012; Rahim *et al.* 2023).

Field visits were planned for collection of herbal flora and preserved properly through pressing, drying, and arrangement in alphabetical order according to family name, and vernacular name. The identification of collected specimens was conducted by comparing them with existing floristic literature (Nasir and Ali, 1970) and online databases like www.theplantlist.org, following the procedures outlined by previous researchers (Ajaib *et al.* 2014). This rigorous identification process ensured accuracy in documenting the flora of the SMR area, providing reliable data for further analysis and research.

Authorization and approval for the study and field survey permission

We obtained proper authorization and permission (Ref No: 31/DEC/BOT/2015; Date: 20/06/2015) from relevant authorities before conducting the data collection and ethnobotanical survey in the SMR. This authorization ensured that our research activities were conducted in compliance with ethical guidelines and regulations, and it allowed us to engage with the local communities and gather valuable information about the herbal flora and traditional knowledge in the region.

We obtained the necessary official field permit (Ref No: DFO/655/2015, Dated: 01/07/2015) from the District Forest Officer (DFO) to conduct field visits within the forest area of the SMR, Bhimber, AJK. This permit allowed us to collect herbal plant samples for our research purposes. Throughout the study, our research team diligently adhered to all forest rules and regulations, as outlined in the Standard Operating Procedures (SOPs) provided by the relevant office. Additionally, we followed the guidance of the District Environment Department (DEC) closely to ensure that our research activities were conducted in a responsible and ethical manner.

Quantitative Ethnobotanical Tools

To ensure the reliability and authenticity of the ethnobotanical (EB) data collected through questionnaires, quantitative analytical tools were employed for tabulation and analysis. The statistical tools used to analyze the EB data from the study area followed the procedures outlined by Amjad *et al.* 2017, and Ishtiaq *et al.* 2021 (Amjad *et al.* 2017). Previous researchers have also utilized these quantitative ethnobotanical indices (Ju *et al.* 2013; Mugisha *et al.* 2014).

Informant Consensus Factor (ICF)

Informant consensus factor was used to validate and verify the data collected from the respondents regarding the use of different plant species. The ICF was calculated using the following equation:

$$ICF = (Nur - Nt) / (Nur - 1)$$

Here, Nur represents the number of use citations minus Nt, which is the total number of plant species used cited by respondents. The result is divided by the number of use citations in each category minus one, as shown in the formula above. A value close to or equal to 1 indicates that the reported plant species is widely used by the local community. On the other hand, a value close to 0 or zero suggests that the reported plant species is used casually by the inhabitants of the area (Vijayakumar *et al.* 2015).

Fidelity Level (FL)

Fidelity level is a measure used in ethnobotanical studies to quantify the relative importance of a particular plant species in traditional knowledge or practices of a local community. It is a way to assess the extent to which a specific plant is used for various purposes within the community. The fidelity level of a plant species is typically calculated using the following formula:

$$\text{Fidelity Level (FL)} = (Np/N) \times 100$$

Np denotes the number of informants who mentioned the specific plant species for a particular use. N is the total number of informants who participated in the ethnobotanical survey. The fidelity level provides valuable information about the cultural importance and significance of a plant within a community. A higher fidelity level indicates that the plant is widely recognized and consistently used for a specific purpose, suggesting a strong and meaningful association between the plant and the local culture or traditional practices.

Researchers and ethnobotanists use the fidelity level to identify priority species with higher FL values, which could have potential significance in terms of their medicinal, nutritional, cultural, or economic value. These priority species can be further studied for their potential pharmacological properties, ecological importance, or for the development of sustainable conservation strategies (Kayani *et al*. 2024; Rahim *et al*. 2023).

Rank Order Popularity (ROP)

The ROP is a method used in ethnobotany to assess the relative importance and popularity of different plant species within a specific cultural context. In the ROP approach, researchers collect ethnobotanical data through interviews, surveys, or field observations, where informants share information about the various plant species they use and the purposes for which they use them. Each informant then ranks the plant species they mentioned based on their perceived importance or frequency of use. The ROP score for each plant species is calculated by summing up the ranks it receives from all informants. The higher the total rank, the higher the ROP score for that particular plant. This ranking process helps identify the most important and preferred plant species within the community, allowing researchers to prioritize certain plants for further investigation and study. The significance of ROP in ethnobotany lies in its ability to provide valuable insights into the cultural significance and traditional practices associated with different plants. By understanding which plants are more popular and widely used, researchers can gain a better understanding of the cultural values and importance attached to these plants within the community. Moreover, the ROP approach aids in conservation efforts by guiding researchers and policymakers to focus on preserving and sustainably managing plant species that are highly valued by the local community. It also fosters better collaboration between researchers and local communities by acknowledging the importance of their traditional knowledge and practice (Song *et al.* 2013).

Relative Popularity Level (RPL)

The RPL and FL are both quantitative measures of the significance of a plant species, but they measure different things (Ishtiaq *et al.* 2007). The RPL measures the number of ailments that a plant species is used to treat, while the FL measures the consistency with which a plant species is mentioned as a treatment for a particular ailment. The RPL and FL can be used together to provide a more comprehensive picture of the importance of a plant species. The RPL can range from 0 to 1, with 1 being the most popular plant species and 0 being the least popular. A plant species with an RPL of 0.5 is used to treat half of the known ailments in a particular region. The RPL is an important tool for ethnobotanists. This information can then be used to prioritize conservation efforts and to develop sustainable management plans for these species. The RPL is also a useful tool for researchers who are studying the traditional uses of plants. By comparing the RPL of different plant species, researchers can gain insights into the cultural significance of these plants and how they have been used over time (Ishtiaq *et al.* 2016; Manzoor *et al.* 2023Ishtiaq *et al.* 2012).

Biodiversity conservation status methods

The area of SMR was divided in fifteen sampling sites with five samplings from each of the tehsils Bhimber, Samahni and Barnala. Nature of environment was analysed by soil erosion, grazing, invasive species, habitat destruction, fuelwood cutting, soil erosion and impacts of other activities were noted. In order to evaluate the floral diversity of an area, many transects walks were made during different seasons throughout the study area, which covered various aspects, hills and different altitude. Resident of area were accessed were receiving valuable data about areas of their extreme availability, abundance and distribution. Data was conformed through many field trips. Special observations were made during field visits of area keeping many parameters in attention. Various parameters were occupied into interpretation like exploitation level, habitat modifications, plant collection methods, area of occupancy, plant availability and conservation effort. The plant species were than characterized into threatened, vulnerable, endangered and rare (Mirzaman *et al.* 2023).

Information on anthropology (gender, age) conservation status (CS) were collected from study site by applying a semi-structured questionnaire. The identified plant species were classified as endangered, vulnerable, rare, or threatened. To determine the conservation status of plant IUCN 2001, Red data list criteria and categories. Personal observation was also included. The data was collected through following formula, (Shah *et al*. 2023).

$$CSP=A+C+G+P$$

Plants were classified into five categories on basis of conservation status (IUCN, 2011)

The conservation classes of plants were determined based on several criteria (Table S1). Firstly, plants were categorized according to their availability in the region, which was classified as "Very Rare," "Rare," "Occasional," or "Abundant." Secondly, the quantity of plant collection was considered, with options ranging from "More than 1000 kg/year" to "Consumed from 100-200 kg/year." Next, the regrowth rate of the plants was assessed, with categories ranging from "Re-growth in more than 3 years" to "Re-growth in a season." Additionally, the part of the plant used was taken into account, including "Whole plant/roots," "Bark," "Fruits/seeds," "Flowers," and "Latex/Gum/Leaves." Finally, the total scores from these criteria were used to assign conservation classes, with "0-4" indicating "Endangered," "5-8" indicating "Vulnerable," "9-12" indicating "Rare," "13-14" indicating "Infrequent," and "15-16" indicating "Dominant."

Results and Discussion

Ethnobotanical description of herbal flora

Among the 248 plant species studied, 47 (18.95%) were trees, 42 (16.93%) were shrubs, and 159 (64.11%) were herbs, all of which were utilized in Traditional Ecological Medicines (TEMs) and ethnobotanical analysis. Additionally, the research revealed that out of the 248 plant species, 120 (48.38%) were annual, 6 (2.44%) were biennial, and 122 (49.18%) were perennial plants. In the study encompassing 72 families, the dominant plant families were identified, providing crucial insights into the area's botanical composition. Poaceae and Asteraceae stood out as the most prevalent families, with 33 and 14 plant species respectively, indicating their abundance in the region. Following closely were Fabaceae with 12 species and Moraceae with 10 species. Euphorbiaceae and Amaranthaceae were notable with 11 species each. Fabaceae and Malvaceae each had 8 species, while Boraginaceae, Acanthaceae, and Solanaceae each contributed 6 species. Lamiaceae was represented by 5 species, and several families, including Asclepiadaceae, Apocynaceae, Capparidaceae, Polygonaceae, Cyperaceae, Rutaceae, and Ranunculaceae, were observed with 4 species each. Meliaceae, Caryophyllaceae, Convolvulaceae, Cucurbitaceae, and Brassicaceae each accounted for 3 species. Furthermore, families such as Adiantaceae, Myrtaceae, Nyctaginaceae, Papaveraceae, Celastraceae, Chenopodiaceae, Combretaceae, Flacourtiaceae, Tiliaceae, Scrophulariaceae, Verbenaceae, and Violaceae were represented by 2 species each. The remaining families were represented by one species each. This diverse array of plant families underscores the rich botanical heritage of the area, providing a foundation for further ecological and conservation studies. Table 1 in the research provides a family-wise arrangement of these plants. This table would give a comprehensive overview of the diversity and distribution of herbaceous plant species in the study area across different plant families. Ethnobotany provides insights into the cultural significance and applications of these plants, encompassing medicinal, culinary, religious, and other practices. The column, "Plant Part Used," details which parts of each herbal plant are utilized, ranging from leaves and roots to flowers, seeds, and essential oils. This comprehensive overview helps understand the diverse role of herbal plants in the study area, their value in local traditions, and their potential contributions to traditional medicine and cultural practices. These findings coincide to the previous work reported by Ajaib *et al.* (2016). The findings highlight the rich botanical diversity of the investigated area, with a wide range of herbaceous plant species distributed across various families. The dominance of Poaceae suggests its ecological and cultural significance in the local ecosystem. It is important to note that the diversity of plant families and species provides a valuable resource for traditional knowledge and potential medicinal applications. The traditional cultures in the area have relied on these plants for treating various ailments, indicating their importance in local healthcare practices

(Ajaib *et al.* 2016). Furthermore, the identification of families and species with a higher number of representatives provides insights into potential areas of focus for further research and drug discovery. Plants belonging to families such as Fabaceae, Amaranthaceae, Fabaceae, Boraginaceae, and Lamiaceae have demonstrated their importance in traditional medicinal practices and could be explored for their pharmacological properties. The study also emphasizes the need for conservation efforts to protect the herbal flora of the investigated area. Threats such as habitat loss, overgrazing, infrastructure development, and domestic land use pose risks to the sustainable availability of these valuable plant resources. Conservation measures should be implemented to ensure the preservation of these plant species for future generations and to maintain the cultural heritage associated with their use (Ishtiaq *et al.* 2016; Ishtiaq *et al.* 2012).

The study surveyed a total of 248 herbal plant species, and the results revealed a diverse range of uses for these plants. Among the surveyed species, 30% were found to be utilized as fodder, indicating their significance as a food source for livestock. Additionally, 24% of the species were used for fuel purposes, highlighting their role in providing energy and resources. Ethnoveterinary uses were observed in 9.8% of the species, indicating their importance in traditional veterinary practices. A smaller percentage, 2.7%, was found to be used for their fibrous properties, while 5.2% served as honeybee plants, suggesting their role in supporting pollinators and honey production. Furthermore, 16% of the surveyed species had domestic applications, likely contributing to various household needs. Lastly, 12% were utilized for cosmetic purposes, reflecting their role in traditional beauty and personal care practices. These findings, as depicted in Figure 2, showcase the diverse and multifaceted contributions of herbal plants to various aspects of human and animal life in the study area.

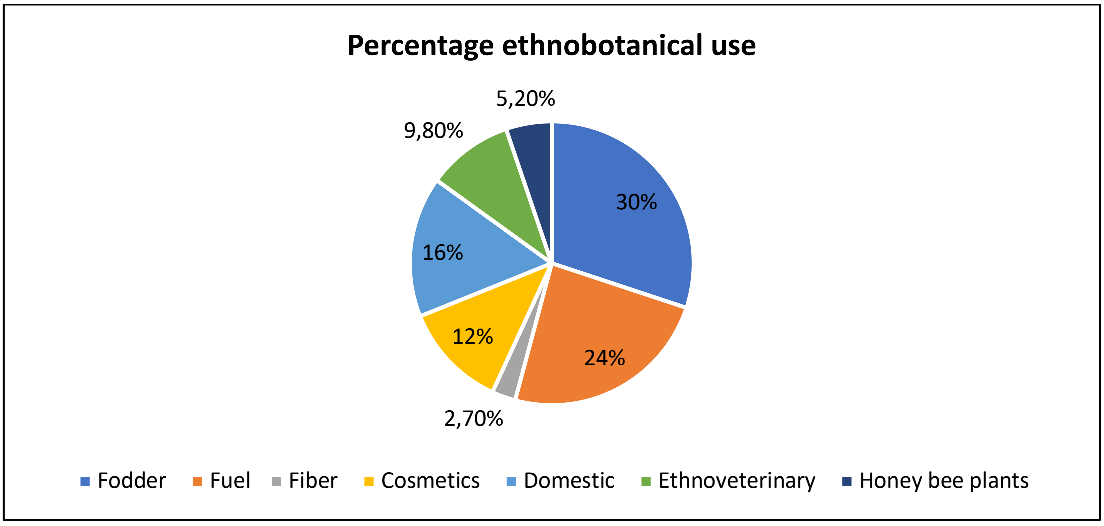

Figure 2. Multifaceted use of plants in Sanghar mountainous range of District Bhimber, AJK, Pakistan

The findings of the present study are consistent with similar research conducted by Hussain et al. (2012) that explored the ethnobotany of angiosperm plants in Rawalakot. Additionally, 22 species were used for timber, indicating their significance in construction and woodworking practices. The ornamental value of 31 species showcased their aesthetic importance in the local landscape. Furthermore, 25 species were employed for fencing lawns and fields, contributing to enclosure and boundary needs. Apart from these uses, 21 species served as vegetables for human consumption, while 9 species were used for thatching houses and huts, providing shelter materials. However, it was noted that 13 species were recognized as poisonous, necessitating caution in their handling and use. The congruence between the two studies reinforces the relevance and importance of these plant species in the lives of local communities, highlighting their multifaceted roles and contributions in various aspects of daily life and cultural practices (Ishtiaq *et al.* 2016; Ishtiaq *et al.* 2012). The results emphasize the multifaceted uses of herbal plant species in the region, reflecting the diverse traditional knowledge and practices of the local communities. The high percentage of species used as fodder and fuel highlights the reliance of the communities on these resources for livestock feed and energy requirements. The presence of ethnoveterinary uses further underscores the significance of these plants in supporting animal health and well-being. Furthermore, the utilization of herbal plants for fibre, honeybee attraction, domestic purposes, and cosmetics indicates their cultural and economic value. These plants play a role in providing raw materials for traditional crafts, supporting beekeeping activities, and meeting household needs. The variety of uses recorded in both studies highlights the versatility and adaptability of herbal plant species in meeting diverse human and livestock needs.

Table 1. Ethnobotany and conservation status of the flora of Sanghar mountain range, Bhimber district, Azad Kashmir, Pakistan.

Scientific Name of Plants	**Family**	**Common name**	**Habit**	**Part used**	**Ethnomedicinal uses**	**References**	**Species Ranking CSP=A+C+ G+P**				**Conservation Status**
							A	**C**	**G**	**P**	
Abutilon indicum (L.) Sweet MUH-1671	Malvaceae	Kangi	Herb	Whole plant	It is used as Anti-diarrheal, anticancer, anti-inflammatory, antidiabetic	Saini *et al*., 2015.	2	1	1	4	Vulnerable
Acacia arabica L. MUH-1672	Fabaceae	Kikar	Tree	whole plant	It is used for wound healing, to cure fever, cold, cough and toothache.	Akhtar *et al*., 2012.	2	2	0	4	Vulnerable
Acacia nilotica (L.) Delile. MUH-1673	Fabaceae	Jangle Kikar	Tree	Stem, Leaves	It is used against foot infection, other skin diseases, sexual disorders and toothache.	Mahmood *et al.*, 2011.	3	1	0	4	Vulnerable
Achyranthes aspera L. MUH-1674	Amaranthaceae	Phothkanda	Herb	Fruit	It is used for curing asthma, fever, cold cough, and constipation	Hamayun *et al*., 2014.	1	3	3	2	Rare
Acrachne racemosa L. MUH-1675	Poaceae	Goose grass	Herb	Whole plant	It is used as fodder for domestic animals.		1	1	0	0	Endangered
Adiantum capillus-veneris L. MUH-1676	Adiantaceae	Median hair fern	Herb	Whole plant	It is used for curing cough, fever, hair caring.	Ahmed *et al*., 2011.	0	0	3	0	Endangered
Adiantum incisum L. MUH-1677	Adiantaceae	Fern	Herb	Leaves	It is used to cure body weakness	Amjad *et al*., 2017.	0	0	3	0	Endangered
Aerva javanica (Burm.f.) Juss. MUH-1678	Amaranthaceae	Bui	Herb	Whole plant	It cures kidney diseases.	Ahmed *et al*., 2007.	0	0	3	0	Endangered
Aerva sanguinolenta (L.) Blume. MUH-1679	Amaranthaceae	Chiti boti	Herb	Whole plant	It is used as Anti-diarrheal, antimicrobial, cure kidney diseases.	Ahmed *et al*., 2007.	0	1	3	0	Endangered
Ajuga bracteosa Benth. MUH-1680	Lamiaceae	Kori Booti	Herb	Whole plant	Whole plant is used to cure stomach diseases, diarrhea, malarial fever.	Ishtiaq*et al*., 2013.	0	3	3	0	Vulnerable

Albizia julibrissin Durazz. MUH-1681	Fabaceae	Jangle shree	Tree	Gum, bark, leaves, flower	It is for the treatment of insomnia, digestive diseases, anticancer, diarrhea.	Ishtiaq *et al*., 2012.	2	2	0	4	Vulnerable
Albizia lebbeck L. MUH-1682	Mimosaceae	Shree	Tree	Bark	Bark of plant is used against asthma, kidney pain and arthritis diseases.	Ajaib*et al*., 2016.	1	1	3	4	Rare
Aloe vera L. MUH-1683	Liliaceae	Kawar gandal	Herb	Leaves	It is used for healing of wound, anticancer, treat diabetes and heart related diseases.	Abbasi*et al*., 2010.	0	0	0	4	endangered
Alstonia scholaris (L.) R. Br. MUH-1684	Apocynaceae	-	Tree	Bark	It is used to treat fever and respiratoy diseases.	Ajaib *et al*., 2016.	0	3	1	1	Vulnerable
Alternanthera pungens L. MUH-1685	Amaranthaceae	Taahee booti	Herb	Whole plant	It is used to treat cancer and eye related diseases, anemia, wound healing	Walter *et al*., 2014.	0	3	3	0	Vulnerable
Amaranthus graecizans L. MUH-1686	Amaranthaceae	Hardar chalei	Herb	Whole plant	It is used as cure diabetes and cardiac diseases.	Mehwish *et al*., 2019.	0	3	3	0	Vulnerable
Amaranthus tricolor L. MUH-1687	Amaranthaceae	Bhaji	Herb	Leaves, root	It is used against snake bite, diuretic, wound healing	Amjad *et al*., 2017.	0	3	3	0	Vulnerable
Amaranthus viridis L. MUH-1688	Amaranthaceae	Ganar	Herb	Whole plant	it is used to control bleeding, to cure diarrhea, wound healing.	Gulshan *et al*., 2012.	2	1	3	0	Vulnerable
Anagallis arvensis L. MUH-1689	Primulaceae	Bili booti	Herb	Leaves	It is used for curing stomach diseases, wound healing.	Amjad *et al*., 2017.	2	2	3	4	Rare
Anisomeles indica (L.) Kuntze. MUH-1690	Lamiaceae	boo buti	Herb	Whole plant	It is used against snake biting, cancer, jaundice and hepatitis.	Mehwish *et al*., 2019.	0	3	3	0	Vulnerable
Anogeissus latifolia (Roxb. ex. DC) Wall. MUH-1691	Combretaceae	Qaam	Tree	Stem, bark	It is used to cure bronchitis and cough.	Mehwish *et al*., 2019.	1	0	1	0	Endangered
Apluda mutica L. MUH-1692	Poaceae	Santli	Herb	Whole plant	Fodder for animals	Mehwish *et al*., 2019.	0	3	3	0	Vulnerable
Argemone mexicana L. MUH-1693	Papaveraceae	Dudhli kandyari	Herb	Whole plant	It is used for the treatment of tumors, skin disorders, warts, and microbial infection.	Kharat *et al*., 2016	1	3	3	0	Vulnerable

Artemisia scoparia Waldst. & Kit. MUH-1694	Asteraceae	Brick stem	Herb	Flowersand leaves	It is used to cure stomach and abdominal diseases	Malik *et al.*, 2011.	0	3	3	4	Rare
Artemisia vulgaris MUH-1695	Asteraceae	Tarkha	Shrub	Leaves, bark, flowers	It is used to cure malarial diseases, asthma, diarrhea and nervous disorders.	Koul *et al.*, 2017.	1	3	3	4	Rare
Arundo donax L. MUH-1696	Poaceae	Narr	Shrub	Root, rhizome	It is used to treat headache, stomach diseases, and cancer related diseases.	Amjad *et al.*, 2017.	1	3	3	0	Vulnerable
Asparagus gracills Browicz MUH-1697	Asparagaceae	-	Herb	Whole plant	It is used as antioxidant and anti-urease activity.	Mehwish *et al.*, 2019.	0	3	3	4	Rare
Asphodelus tenuifolius Caven. MUH-1698	Liliaceae	Bhokal	Herb	Seeds	It is used to cure skin diseases	Qureshi *et al.*, 2010.	0	1	3	2	Vulnerable
Avena fatua L. MUH-1699	Poaceae	Wild oat	Herb	Seeds	It is used to cure skin diseases and cardiovascular diseases	Gulshan *et al.*, 2010.	1	3	3	2	Rare
Azadirachta indica (A.) Juss MUH-1700	Meliaceae	Neem	Tree	Bark	It is used for healing of wounds.	Ajaib *et al.*, 2010.	1	2	2	0	Vulnerable
Barleria cristata L. MUH-1701	Acanthaceae	Sita booti	Herb	Seeds, leaves, and roots	It is used to cure lung infections, against scorpion bite, for diabetes and tooth problems.	Kumar *et al.*, 2018.	0	2	3	0	Vulnerable
Bauhinia variegata L. MUH-1702	Asclepiadaceae	Kachnar	Shrub	Leaves, flowers, fruit	It is used to cure stomach diseases, antibacterial, anticancer.	Memoon *et al.*, 2008.	1	2	3	4	Rare
Berberis lycium L. MUH-1703	Berberidaceae	Sumblu	Herb	Bark	It is used for wound healing and to cure Jaundice.	Abbasi *et al.*, 2010.	2	1	3	1	Vulnerable
Bidens biternata (Lour.) Morr. & Sherff MUH-1704	Asteraceae	-	Herb	Seeds and stem	It is used to treat eye related diseases and used as anthelmintic in animals.	Mehwish *et al.*, 2019.	0	3	3	1	Vulnerable
Boerhavia proembens Banks ex. Roxb. MUH-1705	Nyctaginaceae	Sanati	Herb	Leaves and roots	It is used to cure kidney stones, pneumonia and abscesses.	Ishtiaq *et al.*, 2010.	0	3	3	4	Rare

Bombax ceiba L. MUH-1706	Bombacaceae	Simbal	Tree	Leaves	It is used for the treatment of cough, fever, menstrual pain, flu and sore throat.	Ishtiaq *et al*., 2012.	2	1	1	4	Vulnerable
Broussonetia papyrifera L. MUH-1707	Moraceae	jangli toot	Tree	Stem, fruit, leaves	It is used to cure skin disorders, dysentery and diarrhea.	Naveed *et al*., 2014.	3	1	2	7	Dominant
Bryophyllum pinnatum L. MUH-1708	Crassulaceae	Pather chatt	Herb	Leaves	It is used for wound healing.	Abbasi *et al*., 2010.	`0	3	3	4	Rare
Buddleja asiatica Lour. MUH-1709	Buddlejaceae	Batta	Shrub	Whole plant	It is used to overcome skin diseases.	Qureshi *et al*., 2010.	2	2	3	0	Vulnerable
Buglossoides arvensis (L.) Johnston MUH-1710	Boraginaceae	Kalu	Herb	Leaves	It is used as sedatives.	Amjad *et al*., 2017.	0	3	3	4	Rare
Butea monosperma O. Ktz. (Lam.) MUH-1711	Fabaceae	Chechra	Tree	Stem, leaves	It is used to cure eye related diseases, diabetes, and kidney disorders.	Naveed *et al*., 2014.	1	2	1	5	Rare
Calendula officinalis L. MUH-1712	Asteraceae	Marigold	Herb	Leaves, flowers	It is used as blood purifier, to cure skin disorders, anticancer, healing of wounds, anaemia, and kidney diseases.	Mohammad *et al*., 2012.	0	3	3	4	Rare
Calotropis procera Alton. F. MUH-1713	Asclepiadaceae	Desi aak	Shrub	Latex, flower	It is used for the treatment of asthma, cough, fevers, wounds healing, snake bite and skin diseases,	Gulshan *et al*., 2010.	3	3	2	4	Infrequent
Cannabis sativa L. MUH-1714	Cannabaceae	Bhang	Shrub	Leaves	It is used for the treatment of cough, headache, abdominal pain and used for pleasant, excitement.	Ishtiaq *et al*., 2010.	2	2	3	4	Rare
Capparis decidua L. MUH-1715	Capparidaceae	Tvakri	Shrub	Fruit and flower	It is used to cure skin diseases, anti-inflammatory, fever, asthma, cardiac diseases	Shah *et al*., 2006.	2	1	2	3	Vulnerable

Capparis sepiaria L. MUH-1716	Cyperaceae	Kareer	Herb	Whole plant	It is used as antimicrobial, antifungal and used to cure skin diseases.	Ishtiaq *et al.*, 2021	0	3	1	0	Endangered
Carissa opaca L. MUH-1717	Apocynaceae	Granda	Shrub	Latex, aerial parts.	It is used to cure against snake and scorpion bite, cure stomach diseases, jaundice and hepatitis.	Ishtiaq *et al.*, 2010.	2	2	3	4	Rare
Carthamus oxyacantha L. MUH-1718	Asteraceae	Kandyari	Herb	Flowers, seeds	It is used to cure jaundice and skin disorders.	Ahmad *et al.*, 2010.	2	4	4	3	Infrequent
Casearia tomentosa Roxb. MUH-1719	Flacourtiaceae	Chella	Shrub	whole plant	It is used as fodder.	Kumar, 2016.	0	3	0	0	Endangered
Cassia fistula L. MUH-1720	Fabaceae	Amaltas	Tree	Root, stem, leaves	It is used to treat asthma, fever, and heart related diseases.	Ajaib *et al.*, 2016.	3	4	2	4	Infrequent
Cedrela toona Roxb. MUH-1721	Meliaceae	Cedar	Tree	Gum, bark	It is used for healing of wounds, tonic, dysentery and skin diseases.	Naveed *et al.*, 2014.	1	3	0	4	Vulnerable
Celosia orgentea L. MUH-1722	Amaranthaceae	Gutta boti	Herb	Whole plant	It is used as fodder for animals.	Mehwish *et al.*, 2019.	0	3	4	0	Vulnerable
Cenchrus biflorus Del MUH-1723	Poaceae	Gass	Herb	Leaves and seed	It is used as diuretic, digestive, anti-inflammatory, fever and cold	Abbasi *et al.*, 2010.	4	1	4	4	Infrequent
Cenchrus ciliaris L. MUH-1724	Poaceae	Ghass	Herb	Whole plant	it is used to cure kidney diseases, tumours and wound healing.	Gulshan *et al.*, 2010.	4	1	4	4	Infrequent
Ceropegia bulbosa L. MUH-1725	Ascelpidaceae	Galot	Herb	Tuber, leaves	it is used as anticancer, antimicrobial, kidney disorders and to cure digestive problems.	Ishtiaq *et al.*, 2021	1	4	4	2	Rare
Chenopodium album L. MUH-1726	Chenopodiaceae	Bathu	Herb	Leaves	It is used to cure spleen and kidney disorders.	Memoon *et al.*, 2008.	3	2	4	4	Infrequent
Chenopodium ambrosioides L. MUH-1727	Chenopodiaceae	Mexicana tea	Herb	Leaves, flowers, and seeds.	It is used as anti-cancer, skin diseases and to cure arthritis.	Memoon *et al.*, 2008.	1	3	4	4	Rare

Chrysopogon fulvus (Spreng) Chiov MUH-1728	Poaceae	Lamb Kaa	Herb	Whole plant	It is used to cure respiratory diseases and used as fodder for animals.	Mehwish *et al*., 2019.	1	3	4	4	Rare
Cichorium intybus L. MUH-1729	Asteraceae	Kasni	Herb	Seeds, leaves	It is used as blood purifier.	Ishtiaq *et al*., 2021	0	4	4	1	Rare
Cissampelos pareira L. MUH-1730	Menispermaceae	Batrarr	Herb	Root, leaves, stem	It is used to cure stomach disease, cough, and used against snake bite.	Mehwish *et al*., 2019.	0	4	4	4	Rare
Citrullus colocynthis L. MUH-1731	Cucurbitaceae	Tumma	Herb	Root and fruit	It is used to cure tumor, ulcers, remove pain and swelling	Khan *et al*., 2013.	1	4	4	2	Rare
Citrus acida L. MUH-1732	Rutaceae	Khatta	Shrub	Fruit, leaves, stem	It is used as fodder for animals.	Ajaib *et al*., 2016.	2	0	1	4	Vulnerable
Cleome gynandra L. MUH- 1733	Capparidaceae	Talwar boti	Herb	Leaves	It is used to cure cold, fever, for ear diseases.	Mehwish *et al*., 2019.	0	4	4	4	Rare
Coccinea grandis (L.) Vagt MUH-1734	Cucurbitaceae	Kandyari	Herb	Roots, leaves and fruit	It is used to cure digestive diseases, diarrhea and used as blood purifier.	Mehwish *et al*., 2019.	0	4	4	2	Rare
Colebrookea oppositifolia Smith. MUH-1735	Lamiaceae	Bansa	Herb	Leaf, root, bark	It is used to cure flu, fever, wound healing, epilepsy	Ishtiaq *et al*., 2021	0	4	3	0	Vulnerable
Convolvulus arvensis L. MUH-1736	Convolvulaceae	Rawari	Herb	Whole plant	cure constipation, anti-inflammation, and skin diseases.	Aslam *et al*., 2014.	1	4	4	0	Rare
Cordia obliqua L. MUH-1737	Boraginaceae	Lasoora	Herb	Whole plant	It is used to diuretic, cure fever, joints pain, dry cough, throats pain, tonic, ulcers and treatment of fevers.	Gupta *et al*., 2015.	2	1	1	2	Vulnerable
Coronopus didymus (L.) Smith MUH-1738	Brassicaceae	Jangliu halon	Herb	Whole plant	It is used to relive pain, inflammatory	Nisar *et al*., 2014.	4	3	4	4	Dominant
Caralluma edulis (Edgew.) Bth. and Hk. MUH-1739	Asclepiadaceae	Chunga	Herb	Whole plant	It is used to treat blood diseases, as cooling, and also has anthelmintic effect.	Muhammad *et al*., 2011.	0	3	1	0	Endangered

Crateva adansonii DC. MUH-1740	Capparidaceae	Barna	Tree	Whole plant	It is used to cure urinary organs, relief pain, and burning micturition.	Mehwish *et al*., 2019.	0	1	0	3	Endangered
Crotalaria medicaginea Lam. MUH-1741	Primulaceae	-	Herb	Seed and stem	It is used to cure stomach pain and constipation.	Abbasi *et al*., 2010.	0	3	4	2	Rare
Croton bonplandianum B. MUH-1742	Euphorbiaceae	Wild tulsi	Shrub	Seeds, leaves	It is to control Blood pressure also used for wound healing, skin diseases, jaundice, abdominal pain.	Dutta *et al*., 2018.	0	4	2	4	Rare
Cuscuta reflexa Roxb. MUH-1743	Cuscutaceae	Neel dhari	Herb	Whole plant	It is antiviral and used to treat cough, arthritis, skin disorders, blood purifiers, jaundice, headache.	Sain *et al*., 2015.	0	4	4	0	Vulnerable
Cynodon dactylon L. MUH-1744	Poaceae	Khabal	Herb	Whole plant	It is used as fodder for domestic animals.	Ajaib *et al*., 2010.	4	3	4	4	Dominant
Cynoglossum lanceolatum Forrsk. MUH-1745	Boraginaceae	Leendra	Herb	Whole plant	It is as toothache, cough, tuberculosis	Sharma *et al*., 2009.	0	4	4	0	Vulnerable
Cyperus esculentus L. MUH-1746	Cyperaceae	Nut sadge	Herb	Whole plant	It is used as antioxidant, antibacterial.	Kumar, 2016.	2	1	4	0	Vulnerable
Cyperus iria L. MUH-1747	Cyperaceae	Flat sadge	Herb	Root and fruit	It is used to treat cough, chronic, fever, cold, arthritis and cardiac diseases.	Nisar *et al*., 2014.	3	2	4	4	Infrequent
Cyperus rotundus L. MUH-1748	Cyperaceae	Purple sadge	Herb	Root tubers	It is used to cure digestive and uterus pains.	Gulshan *et al*., 2010.	2	1	4	0	Vulnerable
Dactyloctenium aegyptium L. MUH-1749	Poaceae	Palwan khaa	herb	Whole plant	It is used as fodder for animals.	Ajaib *et al*., 2016.	2	2	4	0	Vulnerable
Dalbergia sissoo L. MUH-1750	Fabaceae	Tali	Tree	Leaves	It is used to cure skin diseases, abscesses, blood purifier, antiseptic and dental care.	Ishtiaq *et al*., 2012.	3	0	1	4	Vulnerable

Datura alba L. MUH-1751	Solanaceae	Datura	Shrub	Whole plant	It is used as antiseptic, sedative, narcotics, and relief asthma.	Gulshan *et al*., 2012.	3	4	1	0	Vulnerable
Datura inoxia Mill. MUH-1752	Solanaceae	Datura	Herb	Leaves, fruit, and seeds	It is used as vermicide, and also as antipyretic.	Mehwish *et al*., 2019.	2	4	1	4	Rare
Desmodium gangetium (L.) DC. MUH-1753	Fabaceae	Jojirii	Herb	Whole plant	It is used against gall bladder, kidney diseases, cough, fever, also used to treat tooth problems,	Mehwish *et al*., 2019.	3	3	3	0	Rare
Dichanthium annulatum Forssk. MUH-1754	Poaceae	Crabgrass	Herb	Whole plants	It is used to cure dysentery, diuretic, tonic, toxic	Nisar *et al*., 2014.	3	1	4	0	Vulnerable
Dicliptera bupleuroides News. MUH-1755	Poaceae	Marvel grass	Herb	Whole plant	It is used as antidiabetic and antimicrobial	Ummara *et al*., 2013.	0	4	4	0	Vulnerable
Dicliptera roxburghiana News. MUH-1756	Acanthaceae	Kali boti	Herb	Plant sap, leaves, flower	It is used as diuretic and treatment of skin diseases.	Ummara *et al*., 2013.	0	4	4	4	Rare
Digera muricata L. MUH-1757	Poaceae	-	Herb	Whole plant	It is used to cure digestive disorders, urinary diseases	Ishtiaq *et al*., 2021	1	3	4	0	Vulnerable
Digitaria nodosa L. MUH-1758	Poaceae	Grass crow foot	Herb		It is used fodder for animal.		1	3	4	0	Vulnerable
Dodonaea viscosa L. MUH-1759	Nyctaginaceae	Santha	Shrub	Leaves	It is used for wound healing.	Abbasi *et al*., 2010.	3	3	3	4	Infrequent
Echinochloa crus-galli L. MUH-1760	Poaceae	Cockspur grass	Herb	Shoots, roots, seed	It is tonic, and antioxidant.	Ali *et al*., 2016.	0	4	4	1	Rare
Eclipta prostrata L. MUH-1761	Asteraceae	Flase daisy	Herb	Whole plant	It is used to treat kidney diseases, hepatitis, nervous disorders and anemia, skin diseases.	Gulshan *et al*., 2010.	1	4	4	0	Rare
Ehretia laevis Roxb. MUH-1762	Boraginaceae	Sakkar	Herb	Whole plant	It is used to cure skin cancer, anti-inflammatory and wound healing.	Thakre *et al*., 2016	0	2	1	4	Vulnerable

Eleusine indica L. MUH-1763	Poaceae	Goose grass	Herb	Whole plant	It is used to cure kidney diseseaes, diarrhea, eye diseases and dysentery.	Burkill *et al.*, 1985.	1	3	4	0	Vulnerable
Emblica officinalis Gaertn. MUH-1764	Euphorbiaceae	Amala	Tree	Fruit	It is used for the treatment of stomach diseases, diabetes, and kidney disorders, asthma and jaundice.	Ishtiaq *et al.*, 2012	1	1	1	2	Vulnerable
Equisetum arvensis L. MUH-1765	Equisteaceae	Horsetail	Herb	Whole plant	It is used to cure kidney diseases.	Hamanyun *et al.*, 2014.	0	4	4	0	Vulnerable
Eucalyptus citriodora Hook MUH-1766	Myrtaceae	Safada	Tree	Leaves	It is used to cure cold, cough, flu, pneumonia and fever.	Ishtiaq *et al.*, 2012.	4	2	3	4	Infrequent
Eugenia jambolana Lam. MUH-1767	Myrtaceae	Jaman	Tree	Leaves, bark, fruit	It is used to cure dysentery, anticancer, antioxidant, reduce sugar level.	Ramteke *et al.*, 2015.	1	1	0	4	Vulnerable
Euphorbia helioscopia L. MUH-1768	Euphorbiaceae	Cathri dodak	Herb	Whole plant	It is used as antiseptic and treatment of skin diseases.	Ch. *et al.*,2009.	2	4	4	4	Infrequent
Euphorbia hirta L. MUH-1769	Euphorbiaceae	Dhodke	Herb	Seeds	It is used for the treatment of diarrhea, tonic.	Ahmed *et al.*, 2011.	3	2	4	2	Rare
Euphorbia prolifera L. MUH-1770	Euphorbiaceae	Dodak	Herb	Whole plant	It is used to treat skin diseases, anemia and kidney diseases.	Ahmed *et al.*, 2011.	2	4	4	0	Rare
Euphorbia prostata L. MUH-1771	Euphorbiaceae	Sand mat	Herb	Whole plant	It is used to cure kidney diseases.	Hamayun *et al.*, 2014	3	3	4	0	Rare
Evolvulus alsinoides (L.) Bioss. MUH-1772	Poaceae	Morning glory	Herb	Leaves	It is used to cure constipation, vomiting and indigestion.	Amjad *et al.*, 2017.	2	3	4	0	Rare
Ficus auriculata L. MUH-1773	Moraceae	Tussa	Tree	Whole plant	It is used to cure diarrhea and Jaundice.	Khan *et al.*, 2011.	2	1	0	4	Vulnerable
Ficus bengalensis L. MUH-1774	Moraceae	Bohrr	Tree	Stem, leaves, seeds	It is used to cure skin diseases, diabetes, tonic and used for toothache	Memon *et al.*, 2008.	2	1	0	4	Vulnerable
Ficus carica L. MUH-1775	Moraceae	Phagwar	Tree	Fruit, leaves, root	It is used for chest infection, constipations, oral infection and gastrointestinal.	Ishtiaq *et al.*, 2012.	2	2	0	2	Vulnerable

Ficus elastica Roxb. MUH-1776	Moraceae	Rubber	Tree	Whole plant	It is used to cure asthma, digestive, skin diseases and diabetes.	Khan *et al*., 2011.	1	4	0	2	Vulnerable
Ficus palmata Forssk. MUH-1777	Moraceae	Phagwar	Shrub	Leaf, fruit	It is used to cure stomach disorders, diabetes, toothache and ulcers.	Ishtiaq *et al*., 2021	2	2	0	2	Vulnerable
Ficus racemosa L. MUH-1778	Moraceae	Tomentosa	Shrub	Fruit, leaves, bark	It is used to cure liver disorders, diarrhea, diabetes and urinary diseases	Ishtiaq *et al*., 2021.	1	4	0	4	Rare
Ficus religiosa L. MUH-1779	Moraceae	Pipal	Tree	Leaves, fruit, bark, root	It is used to treat dysentery, wound healing, fever and diarrhea.	Memon *et al*., 2008.	2	1	0	4	Vulnerable
Flacourtia indica (Burm.f.) Merr. MUH-1780	Flacourtiaceae	Ko-Ko	Tree	Fruit and stem	It is used to treat liver disorders and digestive problems.	Mehwish *et al*., 2019.	0	1	0	2	Endangered
Flueggea virosa L. MUH-1781	Euphorbiaceae	Path geri	Shrub	Whole plant	It is used as an antimicrobial, antioxidant, liver and kidney diseases and wound healing.	Magaji *et al*., 2008.	0	3	2	0	Vulnerable
Fumaria indica Pugsley MUH-1782	Fumariaceae	Papra	Herb	Whole plant	It is Diuretic and used to cure liver and digestive diseases and skin diseases.	Gulshan *et al*., 2010.	2	3	4	0	Rare
Galium aparine L. MUH-1783	Rubiaceae	Lahndara	Herb	Whole plant	It is used to cure fever, diuretic, wound healing and antiseptic.	Ahmed *et al*.,2011.	3	3	3	0	Rare
Grewia optiva L. MUH-1784	Tiliaceae	Dhaman	Tree	Bark	It is used for wound healing.	Abbasi *et al.*, 2010.	2	2	2	0	Vulnerable
Gymnosporia royleana Wall. ex. (Lawson) MUH-1785	Celastraceae	-	Shrub	Whole plant	It is used for the treatment of abdominal pain, cough, respiratory diseases, and digestive problems.	Ajaib *et al*., 2016.	2	2	2	3	Rare
Hedera nepalensis MUH-1786	Araliaceae	-	Herb	Leaves	It is traditionally used for the treatment of diabetes.	Ajaib *et al*., 2016.	3	2	3	3	Rare
*Heliotropium strigosu*m Willd. MUH-1787	Boraginaceae	Gorakh pan	Herb	Leaves, stem, root	It is diuretic, sore pain, snake bite, wound healing and treat boils.	Hussain *et al*., 2010.	1	3	3	0	Vulnerable

Heteropogon contortus L. MUH-1788	Poaceae	Sarala grass	Herb	Whole plant	It cures pneumonia and obesity.	Khan *et al*., 2018.	4	3	4	4	Dominant
Hibiscus-rosa-sinensis L. MUH-1789	Malvaceae	Shoe flower	Tree	Leaves and flowers	It is used for lower cholesterol level, vomiting, lower blood pressure.	Kirshnaiah *et al*., 2008.	3	2	2	3	Rare
Imperata cylindrica L. MUH-1790	Poaceae	Grass	Herb	Root, flower	It is used for wound healing, antijaundice and dysentery.	Khan *et al*., 2011.	1	3	3	3	Rare
Ipomea pes-tigridis L. MUH-1991	Convulvolaceae	Alra Kylar	Herb	Whole plant	It is used to treat boils, pimples, rabies, also used for wound healing and headache, against snake bite, and other poisonous sting.	Mehwish *et al*., 2019.	1	3	3	0	Vulnerable
Ipomoea carnea L. MUH-1792	Convolvulaceae	Aak	Shrub	Leaves, root	It is used for wound healing, skin diseases, dysentery, headache and diabetes.	Ahmed *et al*., 2010.	3	3	3	4	Infrequent
Ipomoea eriocarpa R.Br. MUH-1793	Convolvulaceae	Wanweer booti	Herb	Whole plant	It is used for the treatment of cancer and skin diseases.	Amjad *et al*., 2017	1	3	3	3	Rare
Jasminum mesnyi L. MUH-1794	Oleaceae	Chambli	Shrub	Flowers and root	It is diuretic and used to cure skin diseases, mouth rash and headache.	Naveed *et al*., 2014.	3	1	2	3	Rare
Juglans regia L. MUH-1795	Juglandaceae	khor	Tree	Stem, root, leaves, fruit	It is used as antiseptic and used for the remove stone in gall bladder.		2	2	2	3	Vulnerable
Justicia adhatoda L. MUH-1796	Acanthaceae	Baker	Shrub	Leaves	It is used against arthritis, chest pain, wound healing and suffocations.	Ishtiaq *et al*., 2012.	4	3	4	4	Dominant
Justicia japonica Thunb. MUH-1797	Acanthaceae	-	Shrub	Leaves, root	It is used for wound healing, arthritis and body pains.	Mehmood *et al*.,2011.	1	3	3	0	Vulnerable
Kyllinga brevifolia Rottb. MUH-1798	Cyperaceae	-	Herb	Rhizome, leaves, tubers	It is used to cure digestive, diuretic, tonic, sedative, antimalarial and snake bite.	Kennedy *et al*., 2012.	0	3	3	0	Vulnerable
Lamium amplexicaule L. MUH-1799	Loranthaceae	Purakh	Herb	Flowers, leaves	It is used to cure diabetes, skin diseases, wound healing and use for bone repairing.	Ishtiaq *et al*., 2021.	0	3	3	3	Rare

Lannea coromandelica (Houtt) MUH-1800	Anacardiaceae	Gandela	Tree	Stem, leaves, root	It is used to add flavoring agent in many medicines.	Mehwish *et al*., 2019.	3	2	2	3	Rare
Lantana camara L. MUH-1801	Verbenaceae	Panj pholi	Herb	Leaves	It is used to cure skin diseases, wound healing, anticancer, anti-inflammatory and malarial diseases.	Kalita *et al*., 2012.	2	3	3	0	Vulnerable
Lathyrus aphaca L. MUH-1802	Fabaceae	jangle matr	Herb	Whole plant	It is used to treat burns, anti-inflammatory and anti-bacterial.	Choudhary *et al*., 2014.	2	2	3	0	Vulnerable
Launaea procumbens Roxb. MUH-1803	Asteraceae	Bathala	Herb	Whole plant	It is used for skin diseases, cough, chest pain, obesity and constipation.	Khan *et al*., 2018.	3	3	3	4	Dominant
Leucaena leucocephala (Lam.) de Wit. MUH-1804	Fabaceae	Trakhrad	Herb	Whole plant	It is used as fodder for funa.		2	1	3	4	Rare
Leucas aspera L. MUH-1805	Lamiaceae	Thumbai	Herb	Whole plant	It is used to treat fever, cough, cold and ulcer.	Uniyal *et al*., 2011.	1	3	3	3	Rare
Leucas cephalotes (Roth) Spreng. MUH-1806	Lamiaceae	Kareen	Tree	Whole plant	It is used to treat stomach diseases, flu, fever, flu, fever and constipation.	Mehwish *et al*., 2019.	3	3	3	4	Dominant
Lolium temulentum L. MUH-1807	Poaceae	Sheri bajra	Herb	Whole plant	It is used to treat fever, head-ache, blood congestion, dizziness, digestive problems and skin problems.	Mehwish *et al*., 2019.	0	3	3	3	Rare
Mallotus philippinensis (Lam.) Muell. MUH-1808	Euphorbiaceae	Kamilla	Tree	Stem, leaves, fruit	It is used as antibacterial, antimicrobial agent.	Ajaib *et al*., 2016.	1	3	3	0	Vulnerable
Malva parviflora L. MUH-1809	Malvaceae	Sonchal	Herb	Whole plant	It is important for skin diseases, anti-inflammatory and antimicrobial.	Memoon *et al*., 2008.	0	3	3	3	Rare
Malva sylvestris L. MUH-1810	Malvaceae	High mallow	Herb	Seeds	It is used to cure cough and fever.	Malik *et al*., 2011.	1	3	3	3	Rare

Malvastrum coromandelianum (L.) Garcke MUH-1811	Malvaceae	Damhni	Shrub	Leaf, root, seeds	It is used as an anti-inflammatory, antimicrobial, stomach pain, sore throat and liver infection.	D. B. *et al*.,2015.	3	1	0	4	Vulnerable
Martynia annua L. MUH-1812	Martyniaceae	Bichu boti	Herb	Leaves, fruit	It is used against snake and scorpion bite.		0	3	3	0	Vulnerable
Maytenus royleana Wall. MUH-1813	Celastraceae	Patakee	Herb	Bark, leaves	It is used to cure skin diseases and bone fractures.	Rauf*et al*., 2012	2	3	3	0	Vulnerable
Medicago polymorpha L. MUH-1814	Fabaceae	Sriri	Herb		It is used to cure skin diseases, dysentery and wound healing.	Abbias *et al*., 2013.	1	2	3	4	Rare
Melia azedarach (L.) Pers. MUH-1815	Meliaceae	Darik	Tree	Leaves	It is used for wound healing, anemia and jaundice.	Abbasi *et al*., 2010.	4	3	2	4	Infrequent
Melilotus alba L. MUH-1816	Fabaceae	Shinji	Herb	Leaves	It is used to cure dysentery, cough, bronchial disorders and abdominal pain.	Amjad *et al*., 2017.	0	1	3	4	Rare
Melilotus indica (L.) All. MUH-1817	Fabaceae	jangle methi	Herb	Leaves	It is used to cure bacterial diseases.	Memoon*et al*.,2008.	1	3	3	4	Rare
Mentha longifolia MUH-1818	Lamiaceae	Wild mint	Herb	Whole plant	It is used to treat stomach diseases, antispasmodic and other digestive diseases.	Ajaib *et al*., 2016.	0	3	3	4	Rare
Mentha royleana Benth. MUH-1819	Lamiaceae	Wild mint	Herb	Leaves, stem	It is used to cure cough, throat pain, digestion and constipation.	Malik *et al*., 2011.	1	3	3	1	Vulnerable
Micromeria biflora L. MUH-1820	Fabaceae	Marathi	Herb	Leaves, root	It is used to cure dysentery, colds, cough and abdominal pain.	Ch.*et al*., 2013.	1	3	3	4	Rare
Morus alba L. MUH-1821	Moraceae	Shetoot	Tree	Fruit	It is used to cure cough, fever and throat pain and toothache.	Ahmed *et al*., 2014.	3	3	3	4	Infrequent
Morus nigra L. MUH-1822	Moraceae	Kala toot	Tree	Fruit	It is used to cure anemia, cough, flu and sore throat.	Ahmed *et al*., 2014.	3	3	3	4	Infrequent

Myrsine africana L. MUH-1823	Myrsinaceae	Guggle	Shrub	Leaves	It is used for fodder for livestock.	Ajaib *et al*., 2016.	0	3	2	0	Vulnerable
Nasturtium officinale R.Br. MUH-1824	Brassicaceae	Chooch	Herb	Leaves	It is used to cure stomach diseases, ulcers and intestinal pain.	Malik *et al*., 2011.	3	3	3	4	Infrequent
Nerium oleander L. MUH-1825	Apocynaceae	Gandeera	Shrub	Leaves, latex, bark	It is used to cure stomach pain, skin diseases and toothache, ear and eye problems.	Mehmood *et al*., 2011.	2	3	3	4	Rare
Nicotiana plumbaginifolia Viv. MUH-1826	Solanaceae	Jangli tobacco	Herb	Whole plant	It is used for healing of wounds and cuts toothache and rheumatic.	Dangwal *et al*., 2010.	1	3	3	3	Rare
Ocimum tenuiflorum L. MUH-1827	Lamiaceae	Tulsi	Herb	Leaves	It is used to cure fever, anticancer, skin disorders and heart related diseases.	Gupta *et al*., 2005.	0	3	4	0	Vulnerable
Ocmum bacilicum L. MUH-1828	Lamiaceae	Naiazbu	Herb	Leaves, seeds	It is used to cure cough, fever and flu.	Ahmed *et al*., 2011.	2	2	3	0	Vulnerable
Opuntia monacantha (Willd.) Haw. MUH-1829	Cactaceae	Taraparthor	Shrub	Whole plant	It is used to control diabetes, obesity, diarrhea.	Mehwish *et al*., 2019.	1	3	3	3	Rare
Otostegia limbata L. MUH-1830	Lamiaceae	Kori booti	Herb	Leaves	It is used for wound healing.	Abbasi *et al*., 2010.	2	3	3	0	Vulnerable
Oxalis corniculata L. MUH-1831	Oxalidiaceae	Khati boti	Herb	Fruits and seeds	It is use to cure skin diseases.	Qureshi*et al*., 2009.	1	4	4	0	Rare
Panicum antidotale Retz. MUH-1832	Poaceae	Gyrum	Herb	Whole plant	It is used for healing of wounds, also as a disinfectant.	Mehwish *et al*., 2019.	1	3	3	0	Vulnerable
Papaver dubium L. MUH-1833	Papaveraceae	Jungle post	Herb	Flowers, stem	It is used to cure cough, fever and as antimicrobial.	Altung *et al*., 2010.	0	2	0	3	Vulnerable
Parthenium hysterophorus L. MUH-1834	Asteraceae	-	Herb	Whole plant	It is used an anticancer and antidiabetic.	Khan*et al*., 2013.	4	4	4	3	Dominant
Paspalidium flavidum (Retz.) A. Camus MUH- 1835	Poaceae	Grass	Herb	Whole plant	It is used for relief in heart related diseases.	Mehwish *et al*., 2019.	1	3	3	1	Vulnerable

Pennisetum flaccidum Griseb. MUH-1836	Poaceae	Fountain grass	Herb	Whole plant	It is used to cure fever.	Hassan *et al.*, 2015.	1	3	4	3	Rare
Periploca aphylla Done. MUH-1837	Asclepiadaceae	Batta	Shrub	Stem, fruit	It is used to cure skin diseases, cold, cough, diarrhea and stomach disorders.	Akhtar *et al.*, 2012.	0	3	0	3	Vulnerable
Peristrophe paniculata (Forssk.) L. MUH-1838	Acanthaceae	Kalu	Herb	whole plant	It is used for wound healing.	Ajaib *et al.*, 2010.	2	3	3	4	Rare
Persicaria barbata L. MUH-1839	Polygonaceae	Jor booti	Herb	Whole plant	It is used to treat kidney stones, ulcers, asthma, sedatives, gastric diseases and insecticides.	Ayaz *et al.*, 2020.	3	1	3	0	Vulnerable
Phalaris minor L. MUH-1840	Poaceae	Bunch grass	Herb	Leaves, fruit, seed	It is used to curing cough, dysentery, fever and diarrhea.	Gulshan*et al.*, 2010.	1	3	3	3	Rare
Phoenix sylvestris L. MUH-1841	Arecaceae	Jangli Khajoor	Tree	Fruit, leaves, gum	It is diuretic and used to relief pain, treatment of vomiting and eye inflammation.	Jain *et al.*, 2018.	1	3	3	0	Vulnerable
Phragmites karka (Retz.) Trin. Ex. Steud. MUH-1842	Poaceae	Narr	Shrub	Root, leaves, stem	It is used to treat bronchitis and cholera, diuretic and to cure insect's bite.	Khare *et al.*, 2014	1	3	3	0	Vulnerable
Phyllanthus niruri L. MUH-1843	Phyllanthaceae	Gale of the wind	Herb	Whole plant	It is an anti-inflammatory antibacterial, antiseptic, liver diseases and diuretic.	Kamruzzamn *et al.*, 2016.	3	0	0	2	Vulnerable
Pinus roxburghii Sargent MUH-1844	Pinaceae	Cheer	Tree	Resin, bark, leaves, seeds	It is used for wound healing, reduce cough and for dysentery.	Ajaib *et al.*, 2016.	3	1	0	4	Vulnerable
Poa annua L. MUH-1846	Poaceae	Ghass	Herb	Leaves	It is used as fodder for animals.	Amjad *et al.*, 2015.	4	3	4	4	Dominant
Polygonum plebeium L. MUH-1846	Polygonaceae	-	Herb	Whole plant	It is used to treat pneumonia, liver diseases and heart related diseases.	Choudhary *et al.*, 2011.	0	3	3	4	Rare
Polypogon fugax Nees. MUH-1847	Poaceae	-	Herb	Whole plant	It is used as fodder for animals.	Ajaib *et al.*, 2016.	1	2	3	2	Vulnerable

Populus nigra L. MUH-1848	Polygonaceae	Popular	Tree	Fruit	It is used to cure cough, fever, cold, diuretic, antiseptic and tonic.	Abbasi *et al*., 2012.	2	1	1	4	Vulnerable
Portulaca oleracea L. MUH-1849	Portulacaceae	Zangali Warkhrhay	Herb	Whole plant	It is diuretic, tonic, cure skin diseases and arthritis.	Memoon*et al*., 2008.	1	3	3	2	Rare
Potamogeton nodosus Poir. MUH-1850.	Pamogetanaceae	Jujli	Herb	Whole plant	It is used to treat skin diseases, for constipation and other digestive diseases.	Mehwish *et al*., 2019.	1	3	3	0	Vulnerable
Prosopis glandulosa L.C. VC. HB. MUH-1851	Fabaceae	honey mesquite	Tree	Leaves, stem, root	It is used to treat sore throat, skin diseases and ulcers.	Ajaib *et al*., 2016.	2	3	3	3	Rare
Punica granatum L. MUH-1852	Puniaceae	Druna	Shrub	Fruit	It is used to cure cold, cough, treatment of cardiac diseases, dysentery and diarrhea.	Hamayun *et al*., 2014.	0	3	3	3	Rare
Pupalia lappacea (L.) Juss. MUH-1853	Amaranthaceae	Jojera	Herb	Whole plant	It is used for bone fracture.	Mehwish et al., 2019.	1	3	1	0	Vulnerable
Ranunculus arvensis L. MUH-1854	Ranunculaceae	Corn buttercup	Herb	Whole plant	It is used for wound healing and skin diseases.	Bhat *et al*., 2013.	1	4	4	0	Rare
Ranunculus laetus L. MUH-1855	Ranunculaceae	Chambal booti	Herb	Leaves	It is used for wound healing.	Ajaib *et al*., 2010.	1	3	3	3	Rare
Ranunculus muricatus L. MUH-1856	Ranunculaceae	Gul-eashrafi	Herb	Leaves, fruit	It is used to cure tumors and asthma.	Amjad *et al*., 2017.	0	3	3	3	Rare
Ranunculus sceleratus Linn. MUH-1857	Roseaceae	Akhra	Shrub	Fruit, root, leaves	It is used to cure diarrhea, cough, eye diseases and sore throat.	Amjad *et al*., 2014.	1	3	3	0	Vulnerable
Rhamnus triquetra (Wall) Brandis MUH-1858	Rhamanaceae	Clader	Tree	Leaves, root, stem	It is used to cure malarial fevers, antimicrobial, against intestinal worms, dysentery and diarrhea.	Ajaib *et al*., 2016.	2	3	1	0	Vulnerable
Ricinus communis L. MUH-1859	Asteraceae	Arand	Shrub	Leaves	It is used for increase in milk secretion.	Hamayun *et al*., 2014.	2	3	2	2	Rare
Rubus ellipticus Smith. MUH-1860	Roseaceae	Akhra	Shrub	Fruit, root, leaves	It is used to cure diarrhea, cough, eye diseases and sore throat.	Amjad *et al*., 2014.	2	1	3	0	Vulnerable

Rumex dentatus L. MUH-1861	Polygonaceae	Toothed duck	Herb	Root and leaves	It is used to cure skin diseases, wound healing and coetaneous disorder.	Naveed *et al*., 2014.	3	1	2	2	Vulnerable
Saccharum bengalense Retz. MUH-1862	Poaceae	Khaii	Herb	Whole plant	It is used to cure cough and other respiratory diseases.	Mehwish *et al*., 2019.	3	2	2	1	Vulnerable
Saccharum officinarum L. MUH-1863	Poaceae	Naar	Shrub	Whole plant	It is antiseptic, diuretic and used to cure diarrhea, colds, cough, dysentery, fever and eye related diseases, healing of wounds and anticancer.	Amjad *et al*., 2017.	3	1	3	1	Vulnerable
Saccharum spontaneum L. MUH-1864	Poaceae	Kaai	Herb	Leaves	It is used to cure blood disorders, constipation and liver diseases.	Mussarat *et al*., 2014.	4	3	4	4	Dominant
Salix acmophylla L. MUH-1865	Rutaceae	Bains	Shrub	Leaves	It is used to cure arthritis, fever and body pain.	Malik*et al*.,2011.	3	1	0	4	Vulnerable
Sapindus mukorossi Gaertn (Raitha) MUH-1866	Sapindaceae	Raitha	Tree	Leaves, stem, fruit	It is used to cure skin diseases and for hair treatment.	Ajaib *et al*., 2016.	3	1	3	0	Vulnerable
Senegalia modesta Wall. MUH-1867	Mimosaceae	Phulai	Tree	Leaves, bark, stem, root, gum	It is used to cure dental diseases, stomach disorders and chronic diseases.	Ajaib *et al*., 2010.	4	4	3	4	Dominant
Setaria glauca L. MUH-1868	Poaceae	Green foxtail	Herb	Whole plant	It is used to cure skin disease such as chicken pox.	Ahmad *et al*., 2010.	2	3	3	0	Vulnerable
Sida cordata (Burm. f.) Borss. Waalk MUH-1869	Malvaceae	Paavani	Herb	Leaves	It is used to treat tumors, boils, and cuts.	Mehwish *et al*., 2019.	1	3	3	3	Rare
Sida cordifolia L. MUH-1870	Malvaceae	Berela	Herb	Leaves and roots	It is used to treat dysentery, fever, nervous disorders and heart diseases.	Mehwish *et al*., 2016.	0	3	3	3	Rare
Silene conoidea L. MUH-1871	Caryophyllaceae	Pataki	Herb	Root	It is used for wound healing, against skin diseases, fever, stomach disorders and headache.	Chandra and Rwat, 2015.	3	3	4	4	Dominant

Silybum marianum Gaertn. MUH-1872	Asteraceae	Kanndyara	Herb	Whole plant	It is used as an antidiabetic, treat skin diseases, anticancer and tumor.	Amjad *et al*., 2017.	3	2	3	4	Rare
Sisymbrium irio L. MUH-1873	Brassicaceae	Weed	Herb	Whole plant	It is diuretic, cough and heart diseases.	Gulshan *et al*., 2010.	3	3	3	3	Rare
Solanum nigrum L. MUH-1874	Solanaceae	Katch match	Herb	Leaves	It is used to cure skin diseases.	Hamanyun *et al*., 2014.	2	3	4	2	Rare
Solanum surattense Burm. MUH-1875	Solanaceae	Marhaghonay	Herb	Whole plant	It is used to cure diuretic, cough, fever and chest pain.	Amjad *et al*., 2017.	0	1	1	3	Vulnerable
Sonchus arvensis L. MUH-1876	Asteraceae	Sowthistle	Herb	Leaves, root	It is an anti-inflammatory and used to cure asthma, cough and chest pain.	Gulshan *et al*., 2010.	3	1	3	0	Vulnerable
Sonchus asper (L.) Hell MUH-1877	Asteraceae	spiny Sowthistle	Herb	Whole plant	It is used as fodder for cattle.	Naveed*et al*., 2013.	3	3	4	0	Rare
Sorghum halepense L. MUH-1878	Poaceae	Baru	Shrub	Seeds	It is diuretic and antibacterial.	Ahmed *et al*., 2008.	4	1	3	2	Rare
Sporobolus coromandelianus (Retz.) Kunth MUH-1879	Poaceae	Smut grass	Herb	Whole plant	It is used as blood clotting, reduce swelling, healing of wounds.	Mehwish *et al*., 2019.	2	2	1	0	Vulnerable
Stellaria media (L.) vill. MUH-1880	Caryophyllaceae	Jangli Boti	Herb	Whole plant	It is used to cure asthma, diarrhea, digestive disorders, kidney diseases and reproductive diseases.	Mehwish *et al*., 2019.	1	2	1	2	Vulnerable
Taraxacum officinale L. MUH-1881	Asteraceae	Hand	Herb	Leaves	It is used to cure bone fractures.	Malik *et al*., 2011.	2	3	4	0	Rare
Tecoma stans L. MUH-1882	Bignoniaceae	_	Tree	Bark, stem, leaves, root	It is used to treat diabetes, digestive problems, tonic, antimicrobial and diuretic.	Singh *et al*.,2013.	2	2	3	0	Vulnerable
Telosma cordata (Burn. f.) Merr. MUH-1883	Apocynaceae	Pakalana	Herb	Whole plant	It is used to cure bone diseases or arthritis.	Mehwish *et al*., 2019.	1	2	3	0	Vulnerable

Tephrosia purpurea (L.) Pers. MUH-1884	Fabaceae	Sarmak	Herb	Whole plant	It is used to cure liver, spleen diseases, cardiovascular diseases, blood related diseases, also used as urinary disorders, diarrhea, and teeth related problems.	Mehwish *et al*., 2019.	2	1	3	2	Vulnerable
Terminalia bellirica (Gaertn) Roxb. MUH-1885	Combretaceae	Baihra	Tree	Leaves, stem, root	It is used to cure liver diseases, treat respiratory diseases including cough and sore throat.	Kumar *et al*., 2018.	1	3	0	2	Vulnerable
Themeda antheria Nees. MUH-1886	Poaceae	Red grass	Herb	Whole plant	It is used for wound healing.	Ajaib *et al*., 2016.	1	3	3	0	Vulnerable
Trianthema portulacastrum L. MUH-1887	Aizoaceae	Itsit	Herb	Whole plant	It is used to treat blood related diseases, diuretic, night blindness and cancer related diseases.	Pawar *et al*., 2012.	1	4	4	0	Rare
Tribulus terrestris L. MUH-1888	Zygophyllaceae	Bullhead	Herb	Whole plant	It is used to cure kidney diseases, diuretic, tonic and stomach diseases.	Akram *et al*., 2011.	1	3	4	0	Vulnerable
Trichodesma indicum L. MUH-1889	Boraginaceae	Borage	Herb	Leaves	It is used for wound healing	Abbasi *et al*., 2010.	1	3	0	2	Vulnerable
Trichosanthes cucumerina L. MUH-1890	Cucurbitaceae	Parul	Herb	Leaves	It is used to cure skin diseases, antidiabetic, diuretic and cure ulcers.	Priyanka *et al*., 2012.	1	3	3	3	Rare
Tridax procumbens L. MUH-1891	Asteraceae	Kuthi	Herb	Whole plant	It is for the treatment of skin diseases, healing of wounds and antifungal.	Beck *et al.,* 2018.	1	3	2	1	Vulnerable
Trifolium dubium L. MUH-1892	Fabaceae	Suckling clover	Herb	Whole plant	It is used for constipation, antidiabetic, cure cancer and arthritis.	Sabudak. 2009.	0	3	3	1	Vulnerable
Trifolium repens L. MUH-1893	Fabaceae	White clover	Herb	Whole plant	It is used to cure fever, cough and cold.	Ch. *et al*., 2013.	1	3	3	3	Rare
Trifolium resupinatum Linn. MUH-1894	Fabaceae	Loosin	Herb	Whole plant	It is used fodder for animals.	Sabudak. 2009.	1	3	1	2	Vulnerable

Triumfetta pentandra A. Rich MUH-1895	Tiliaceae	Permothii	Herb	Whole plant	It is used to treat skin problems, healing of wounds, treatment of goiter.	Mehwish *et al*., 2019.	0	2	3	4	Rare
Urena lobata L. MUH-1896	Lamiaceae	Kangi	Herb	Whole plant	It is used for healing of wounds, cure skin diseases, for, colds, dysentery, malarial diseases and respiratory diseases.	Mehwish *et al*., 2019.	0	3	3	3	Rare
Urochloa panicoides P. Beauv MUH-1897	Poaceae	Harat	Herb	Whole plant	It is used as fodder for livestock.	Mehwish et *al*., 2019.	0	3	3	3	Rare
Urtica dioica L. MUH-1898	Urticaceae	Bichu boti	Shrub	Leaves	It is allergic plant.	Ch.*et al*., 2013.	0	3	3	4	Rare
Vaccaria hispanica (Mill.) MUH-1899	Caryophyllaceae	Masna	Herb	Whole plant	It is used to cure skin diseases, blood tumors, and cardiac diseases.	Mehwish *et al*., 2019.	0	3	3	3	Rare
Vitis vitiginea (L.) Theob	Vitaceae	Dakh	Herb	Whole plant	It is used to cure diabetes, wound healing, cardiovascular diseases and bone diseases.	Hussain *et al*., 2009.	1	3	3	3	Rare
Vachellia nilotica (L.) P.J. Hurter & Mabb. MUH-1901	Mimosaceae	Kikar	Tree	Leaves, flowers, seeds, stem	It is used for the treatment of skin disease, for tooth problems, diabetes and dysentery.	Mehwish *et al*., 2019.	0	3	3	3	Rare
Vallaris solanacea (Roth) O. Kuntze. MUH-1902	Apocynaceae	Dhudi	Herb	Whole plant	It is antimicrobial, antidiabetic, skin infection, and wound healing.	Greeshma *et al*., 2020.	1	3	3	3	Rare
Verbascum thapsus L. MUH-1903	Scrophulariaceae	Gidar tobacco	Herb	Leaves and flowers	It is used to cure respiratory and pulmonary diseases.	Ajaib *et al*., 2016.	1	3	3	2	Rare
Veronica anagallis L. MUH-1904	Scrophulariaceae	Hazar booti	Herb	Whole plant	It is used to treat throat infection.	Li *et al*.,2015.	1	3	3	3	Rare
Veronica polita Fr. MUH-1905	Plantaginaceae	Sriri	Herb	Plant juice	It is used for cuts, burns and sore throat infection.	Ummara *et al*., 2013.	0	3	1	3	Vulnerable

Vicia hirsuta L. MUH-1906	Fabaceae	-	Herb	Whole plant	It is diuretic, antidiabetic, antioxidant and antimicrobial.	Salehi *et al*., 2020	0	3	3	3	Rare
Vicia sativa L. MUH-1907	Fabaceae	Chiri panja	Herb	Whole plant	It is diuretic antimicrobial, antioxidant and antidiabetic.	Salehi *et al*., 2020	1	3	3	3	Rare
Viola biflora L. MUH-1908	Violaceae	Phul Naqsh	Herb	Leaves	It is used to relief headache, flu and cough.	Ajaib *et al*., 2010.	0	3	3	0	Vulnerable
Viola canescens Wall. ex. Roxb. MUH-1909	Violaceae	Banfsha	Herb	Floral parts	It is used to relief cough, fever and sore throat.	Malik *et al*., 2011.	1	3	3	0	Vulnerable
Vitex negundo L. MUH-1910	Lamiaceae	Bna	Shrub	Leaves, root, bark	It is anticancer, anti-inflammatory, antimicrobial and tonic.	Basri *et al*.,2014.	4	2	4	4	Infrequent
Withania somnifera L. MUH-1911	Solanaceae	Dodak	Herb	Root, fruit	It is used to cure nervous diseases, ulcers and anti-inflammatory.	Gulshan*et al*., 2010.	0	3	0	2	Vulnerable
Woodfordia fruiticosa (L.) Kurz MUH-1912	Lythraceae	Tahvi	Herb	Whole plant	It is used to cure fever, dysentery and used as toothache.	Kumar *et al*., 2016.	1	3	3	0	Vulnerable
Xanthium strumarium L. MUH-1913	Asteraceae	Bahkra	Herb	Whole plant	It is used against smallpox, malarial fever, dysentery and poisons.	Mehmood *et al*., 2011.	3	4	4	0	Rare
Youngia japonica L. MUH-1914	Asteraceae	Chirotta	Shrub	Leaves	It is used for healing wounds and used to cure other skin diseases.	Rahman *et al*., 2013.	0	3	0	3	Vulnerable
Zanthoxylum alatum DC. MUH-1915	Rutaceae	Timber	Shrub	Whole plant	It is used to cure diarrhea, indigestion and bronchitis.	Hayat *et al*.,2018.	1	3	0	0	endangered
Ziziphus mauritiana MUH-1916	Rhamnaceae	Jandi	Tree	Fruit, bark, leaves	It is anticancer, tonic, blood purifier and used to cure fever.	Muhammad *et al*., 2010.	2	1	3	4	Rare
Ziziphus jujuba L. MUH-1917	Rhamanaceae	Jand-beri	Tree	Leaves	It is used to treat Diabetes.	Hamayun *et al*., 2014.	4	3	2	4	Infrequent
Ziziphus nummularia L. MUH-1918	Rhamnaceae	Kokan Jhand	Tree	Bark, leaves, root	It is used to reduce obesity, blood purifier, diarrhea, anemia, snake biting and wound healing.	Sunita Verma, 2016.	4	4	3	4	Dominant

The identification of poisonous species is of particular importance for ensuring the safety and well-being of the local communities. Proper knowledge and awareness regarding the toxic plants are crucial to avoid any potential harm or misuse (Shaukat *et al.* 2012; Thind *et al.* 2021). The documentation of such knowledge not only preserves traditional practices but also provides valuable insights for sustainable resource management, conservation, and potential utilization in various sectors such as agriculture, livestock, and traditional medicine. An ethnobotanical study (Thind *et al.* 2021) reported 26 plant species from 19 families for their traditional uses by the local people of Rawalakot, AJK, Pakistan. The family Lamiaceae had the highest representation with the maximum number of species. The local names of the plants, their flowering period, habitat, status (such as common or rare), parts used, and the diseases they were traditionally used to treat were reported. The gathered information provided insights into the traditional knowledge and practices of the local community in utilizing these medicinal plants for therapeutic purposes. The study conducted by Khan *et al.* (2012) in the Poonch valley, AJK documented similar results. The reported diseases seemed to have significant importance in the local community, and the study aimed to identify plant species used to manage these ailments (Shaukat *et al.* 2012; Thind *et al.* 2021).

Ethnomedicine exploration

The study found that 11.9 % of the 248 herbaceous plants identified were used to treat skin diseases, 6.87%% for wound healing, 14.4% for fever, 7.65 % for gastric or stomach issues, 12.13% for cough, and 12.7% for cancer. Other ailments treated with the plants included jaundice (7.14%), asthma (4.6%), kidney diseases (8.09%), diabetes (9.2%), snake bites (4.62%), and tooth problems (1.7%) as shown in figure 3. The use of ethno medicines to treat diarrhoea, digestive issues, and cough has also been reported in the work of Rehman *et al*. (2023), focusing on the utilization of therapeutic plants by the inhabitants of Shawal Valley, North Waziristan, Pakistan.

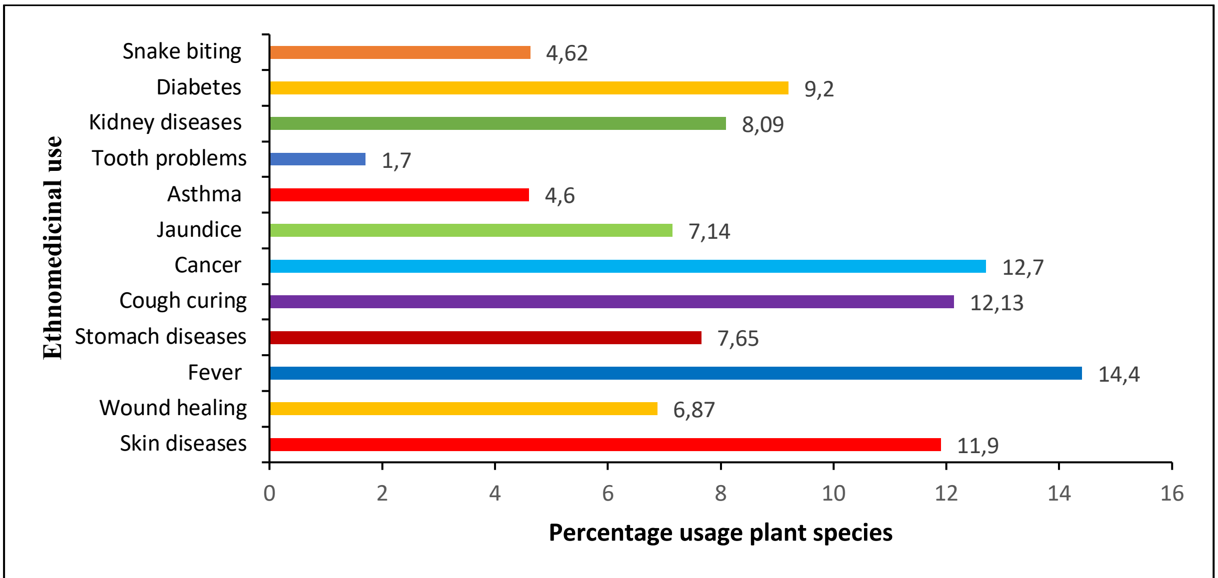

Figure 3. Ethnomedicinal usage of various herbs from Sanghar mountain range, Bhimber district, Azad Kashmir, Pakistan.

The current findings align with previous research conducted in the region, corroborating the work of several studies, including those by Shinwari and Khan (2000), Sheikh *et al.* (2013) Shinwari and Khan (2011), and Farooq et al. (2012). In particular, Hussain et al. [38] conducted a noteworthy study, revealing that a shift towards a more sedentary and luxurious lifestyle was linked to the prevalence of numerous acute and chronic health issues. This highlights the potential impact of changing lifestyles on health and well-being in the region. This demonstrates the continued reliance on traditional medicinal practices and underscores the importance of these plants in addressing health concerns within the community. The collective evidence from these studies emphasizes the significant role of herbal plants in maintaining the health and cultural heritage of the region and reinforces the importance of conserving and promoting traditional knowledge and practices.

Different parts of plants were found to be utilized for treating various diseases. Specifically, plant leaves accounted for 23.3 % of the reported uses, followed by whole plants at 13.3 %, fruits at 11.3 %, roots at 12.1 %, flowers at 5.3 %, seeds at 9.6 %, resins or gums at 2.1 %, and stems at 23 % (as shown in Figure 4). The use of leaves in the ethnomedicine has been reported by several workers including Kayani *et al*. (2024) from Pallas valley, from north of Pakistan. Additionally, these findings are consistent with earlier studies conducted in Island and Italy, which also highlighted the frequent use of leaves in herbal medicine (Husain *et al.* 2008; Shaukat *et al.* 2012; Thind *et al.* 2021). The preference for leaves and stems can be attributed to their higher effectiveness compared to other plant parts, such as bark and roots. Leaves tend to contain a greater number of chemical constituents, making them potent sources of therapeutic compounds (Pardhi *et al.* 2010). The utilization of different plant parts for medicinal purposes underscores the comprehensive approach employed by traditional healers and local communities in harnessing the healing potential of plants. The selection of specific plant parts for treatment may be influenced by factors such as cultural practices, traditional knowledge, availability, and accessibility of plant resources.

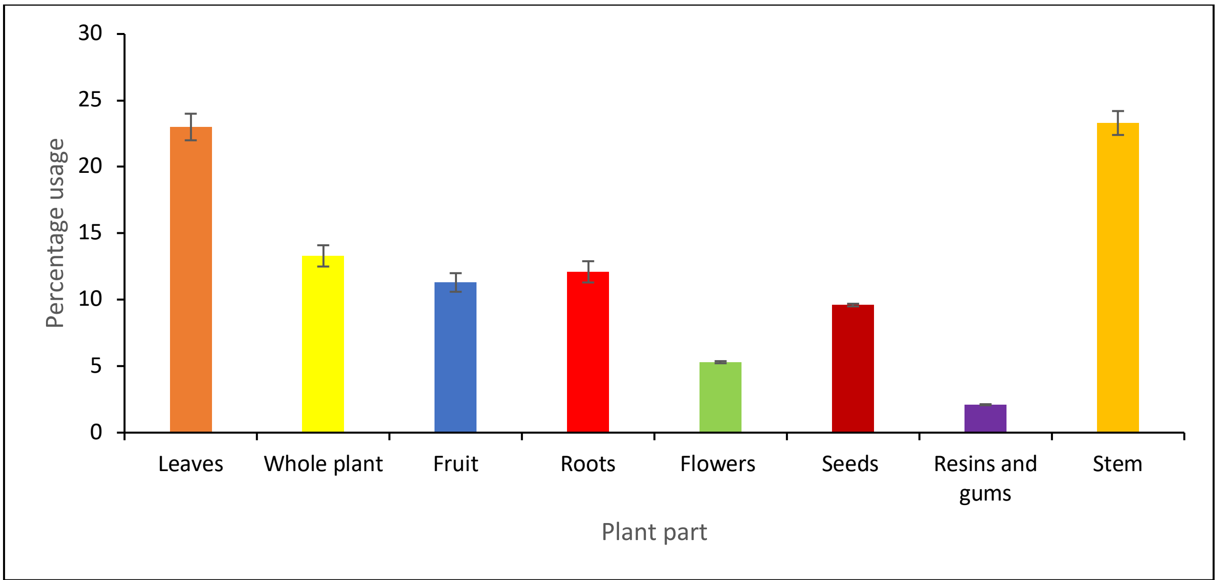

Figure 4. Percentage usage of various plant parts in making ethnomedicine by the indigenous communities of Sanghar mountain range, Bhimber district, Azad Kashmir, Pakistan.

Conservation status

The local herbal plants, despite their small size and delicate biomass, hold significant importance in the lives of the indigenous communities, who utilize them for various ethnobotanical purposes. However, the continuous and indiscriminate harvesting and usage of these plants by the local population have led to the loss of many herbaceous species in the study area. Based on the collected data, a considerable number of native plant species in the study area are actively used by the local inhabitants for various purposes. This reliance on natural resources is primarily driven by the lack of alternative options and the high cost of commercially available products (Maqbool *et al.* 2019; Mahmood *et al.* 2011).

In the Sanghar Mountain Range (SMR) of District Bhimber, plant diversity is declining due to both natural factors like drought and human-induced issues. Statistical analyses employing priority ranking confirm the substantial stress faced by the local flora, exacerbated by both human activities and climate change. Among the 248 plant species studied, 4.64% were dominant, 5.24% endangered, 43.54% vulnerable, 38.70% rarely distributed, and 6.85% infrequent, indicating the urgent need for focused conservation efforts (Table 1). Human activities, including timber cutting, grazing, fires, and deforestation, pose severe threats to the local flora. The indiscriminate use of plants as fuel wood contributes significantly to this problem, with many valuable shrubs and trees being annually removed. Additionally, illegal timber cutting, land clearance for construction, and uncontrolled grazing further exacerbate the situation. Medicinal plants, once considered secure, are now endangered due to over-collection.

The decline in plant diversity, a vital component of Earth's ecosystems, is a cause for significant concern. This decline can be attributed to a complex interplay of natural factors and human-induced issues. Natural factors, such as drought, play a significant role in shaping plant populations. Prolonged periods of low rainfall and water scarcity adversely affect plant growth and reproduction, leading to a decline in plant species. Climate change exacerbates these natural factors, altering precipitation patterns and increasing the frequency and intensity of droughts, thereby posing a severe threat to plant biodiversity. On the other hand, human-induced issues are equally responsible for the diminishing plant diversity. Deforestation, driven by demands for timber, agricultural expansion, and urban development, disrupts natural habitats, leading to the loss of numerous plant species. Pollution, including air and water pollution, contaminates soil and water sources, making it challenging for plants to thrive. Invasive species, introduced by human activities, often outcompete native plants for resources, further reducing plant diversity. Overexploitation of plants for various purposes, such as fuelwood, medicine, and construction, poses a significant threat. Unsustainable harvesting practices, especially in regions where plant resources are essential for local livelihoods, deplete populations rapidly. Moreover, habitat degradation due to industrialization and infrastructure development destroys natural habitats, making it difficult for plant species to survive. Conservation efforts are crucial to mitigating these challenges. Strategies include protecting natural habitats, implementing sustainable harvesting practices, raising awareness about the importance of plant diversity, and developing policies to combat climate change. Collaboration between governments, conservation organizations, and local communities is essential to address both natural and human-induced factors, ensuring the preservation of plant diversity for future generations.

The extensive utilization of natural resources poses a serious risk to the abundance and availability of these plant species. The calculated values provide a classification of plants based on the factors contributing to their decline (Hussain *et al.* 1996). The heavy reliance of the villagers on wood for various purposes such as furniture making, fuel, construction, and tool production. Additionally, fresh tree parts are used as fodder. This dependence on wood resources poses a significant threat to the natural flora in the study area. In the study area, *Aerva sanguinolenta, Citrullus colocynthis, Hyoscyamus niger, Trichodesma indicum, Boerhavia diffusa, Solanum surratense, Viola canescens*, and *Ajuga bracteosa* are among the species identified as threatened, with some facing the risk of extinction (Bibi *et al.* 2014; Abbasi *et al.* 2013). Urgent conservation efforts are needed to protect these valuable plants. Similar recommendations for the conservation of wild flora have been made in other regions of Pakistan and the world. These plants possess high medicinal potential, and their conservation can provide opportunities for commercial use and drug development for future generations. In conclusion, the study emphasizes the ethnomedicinal significance of herbal plants in the SMR of District Bhimber (Bibi *et al.* 2014; Abbasi *et al.* 2013; Bussman, 2002).

Ethnobotanical indices: Fidelity level, rank order popularity, relative popularity level, and informant consensus factor

Understanding the distribution of medicinal properties across different plant parts is valuable for optimizing the use of plant resources in traditional medicine and potentially identifying key bioactive compounds. The studies on chemical composition and bioactivity of specific plant parts provide deeper insights into their therapeutic potential and support the development of evidence-based herbal medicines. Furthermore, the mountain flora as reported by the study holds prime significance in ecological sustainability. Mountain regions boast diverse flora, encompassing a wide array of plant species that have significant medicinal value. These plants often have adapted to the harsh environmental conditions of high altitudes, developing unique chemical compositions that enable them to thrive in these challenging climates. The medicinal significance of mountain flora lies in their ability to produce bioactive compounds with therapeutic properties, including antioxidants, anti-inflammatory agents, and antimicrobial substances. Traditional knowledge systems in many mountain communities have long recognized the healing potential of these plants, utilizing them for treating various ailments and promoting overall well-being. Moreover, the conservation of mountain flora is crucial not only for preserving biodiversity but also for sustaining the supply of natural remedies that contribute to global healthcare (Manzoor *et al*. 2023; Gillani *et al*. 2024). The data on ICF has been mentioned in table 2 whereas data on fidelity level of some important herbal species, their ROP, and RPL has been mentioned in the figures 5, 6, and 7. In the study, major ailments were categorized into 12 disease categories using the International Classification of Functioning, Disability, and Health. The findings highlighted that certain ailments were particularly targeted by herbal remedies.

Table 2. The Informant Consensus Factor (ICF) values for different categories of animal ailments and the corresponding medicinal plant species used in the studied area.

Categories	**No. of species(nt)**	**No. of Use citation (nur)**	$\mathbf{ICF = \frac{nur - nt}{nur - 1}}$
Skin diseases	04	11	0.7
Wound healing	08	18	1.1
Fever	09	24	0.6
Stomach diseases	09	12	0.3
Cough curing	06	14	0.6
Cancer	04	17	0.9
Jaundice	06	13	0.5
Asthma	03	11	0.8
Tooth problems	07	10	0.3
Kidney diseases	06	13	0.6
Diabetes	04	17	0.8
Snake biting	03	19	0.9

The table provides insights into the traditional use of herbal plants for treating various disease categories. Each row corresponds to a specific ailment, and the columns represent the number of plant species used (nt), the number of use citations (nur) that indicate how frequently the plants are cited for each condition, and the Index of Cultural Significance (ICF) calculated for each category. Among the disease categories, "Wound healing" and "Cancer" stand out with higher ICF values of 1.1 and 0.9, respectively, indicating a strong consensus and reliance on specific plants for treating these conditions. "Skin diseases," "Asthma," "Diabetes," and "Snake biting" also show notable ICF values of 0.7, 0.8, 0.8, and 0.9, respectively. On the other hand, "Fever," "Jaundice," "Cough curing," and "Kidney diseases" demonstrate lower ICF values ranging from 0.5 to 0.6, suggesting a comparatively lesser agreement among communities for plant usage in these categories. The data underscores the importance of these herbal plants in traditional healthcare practices and provides valuable insights into their cultural significance as remedies for various ailments in the community. In the table, several important plants are highlighted based on their Fidelity Levels (FL) and their relevance in treating specific ailments. *Brassica campestris* L. from the Brassicaceae family emerges as a standout with an FL of 34.29%, making it a significant plant in antidiabetic treatments. *Aloe vera* L. from the Xanthorrhoeaceae family is highly regarded for its efficacy in treating skin diseases, evident from its FL of 36.6%. *Withania somnifera* L., also known as Ashwagandha, demonstrates its importance in ulcer management with an FL of 8.57%. *Portulaca quadrifida* L. is valued for its antibacterial properties with an FL of 8.57%, while *Medicago sativa* L. is recognized for wound healing with an FL of 11.43%. The traditional use of *Cyperus rotundus* L. for digestive diseases is confirmed by its FL of 14.29%. *Boerhavia diffusa* L. is significantly employed in kidney disease treatments with an FL of 11.43%. Lastly, *Ocimum sanctum* L., or Holy Basil, showcases its relevance in heart disease management with an FL of 11.43%. These findings underscore the cultural importance of these plants in traditional healthcare practices, reflecting the enduring knowledge and wisdom passed down through generations. Such insights into the medicinal potential of these plants contribute to the preservation and promotion of traditional herbal remedies (Bibi *et al.* 2014; Abbasi *et al.* 2013).

These results shed light on the significant role of certain herbal plants in addressing specific health conditions, and the Fidelity Level highlights the trust and reliability local communities place in these plants for targeted treatments. The study underscores the importance of understanding and preserving traditional herbal knowledge, especially concerning these valuable plant species that play a crucial role in local healthcare practices. These findings align with a similar study conducted by Ishtiaq *et al.* (2021). The consistency in the results suggests a commonality in traditional medicinal practices across different regions. The ICF results for ethnomedicines corroborate the findings of previous investigations conducted by various experts worldwide (Bibi *et al.* 2014; Abbasi *et al.* 2013). This further emphasizes the global significance of traditional healing practices and the potential of ethnomedicinal knowledge in addressing healthcare needs.

The ICF values obtained for diseases in the study area are consistent with previous studies conducted in different regions of Pakistan and Azad Kashmir (Bibi *et al.* 2014; Abbasi *et al.* 2013). This congruence in findings highlights the prevalence and importance of certain diseases in these areas, as well as the reliance on specific plant species for their treatment. The identification of plant species with high FL values indicates their cultural and therapeutic significance in the local community. *Brassica campestris* L., *Aloe vera* L., and *Adiantum capillus-veneris* L. emerge as valuable medicinal resources, particularly for treating diabetes, skin diseases, and arthritis, respectively. These plants hold promise for further exploration in the development of herbal remedies and the discovery of bioactive compounds. The similarities observed between the current study and previous research validate the robustness and consistency of ethnomedicinal knowledge (Ilker *et al.* 2009; Vitalini *et al.* 2013) and the work of Mirzaman et al. (2023). Furthermore, ethnomedicinal practices often focus on holistic healing, considering not just the physical but also the mental and spiritual aspects of health. This holistic approach can enhance patient care and contribute to a more comprehensive understanding of health and wellness. Revitalizing these practices also plays a crucial role in preserving cultural heritage, as ethnomedicinal knowledge is often deeply intertwined with a community's history, customs, and identity (Rahmi *et al*., 2023).

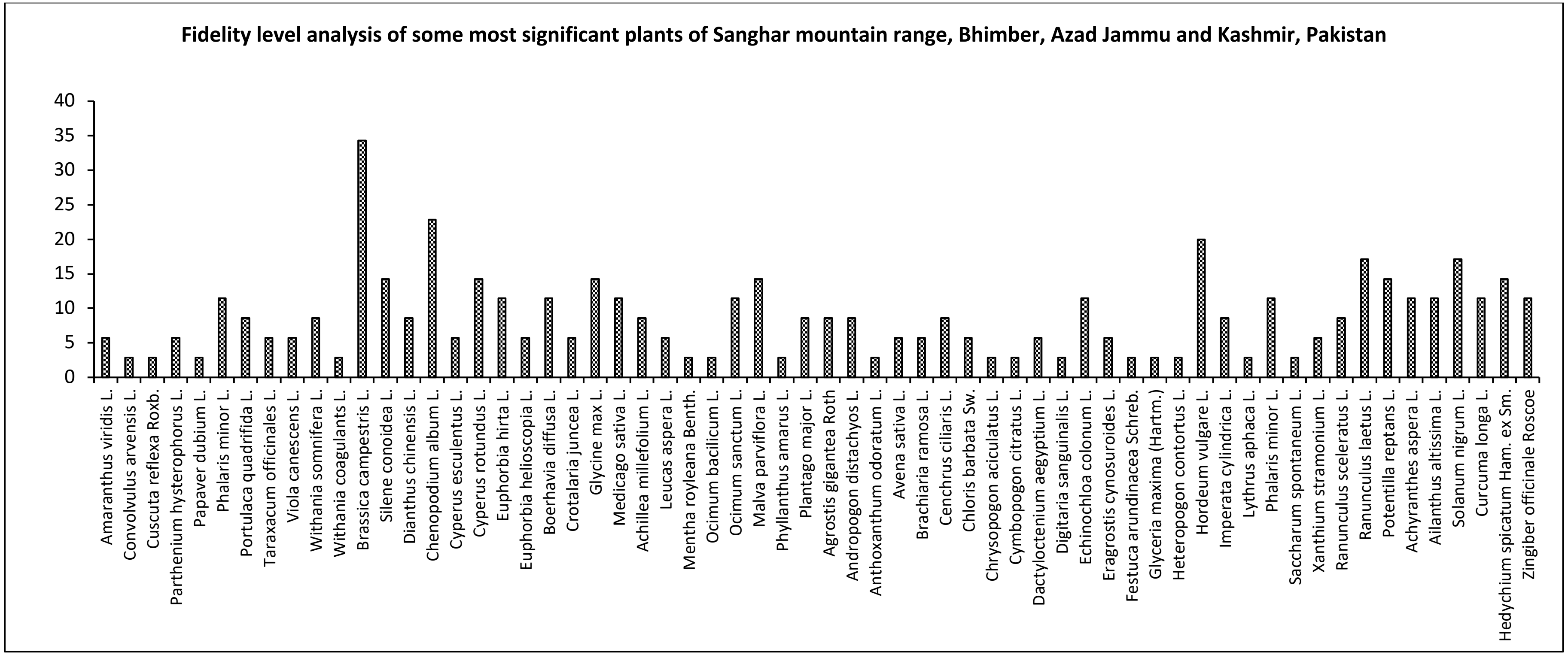

Figure 5. Fidelity level analysis of some plants reported in table 1. FL=Np/N×100 is the frequency of the ailment relative to the total number of plants.

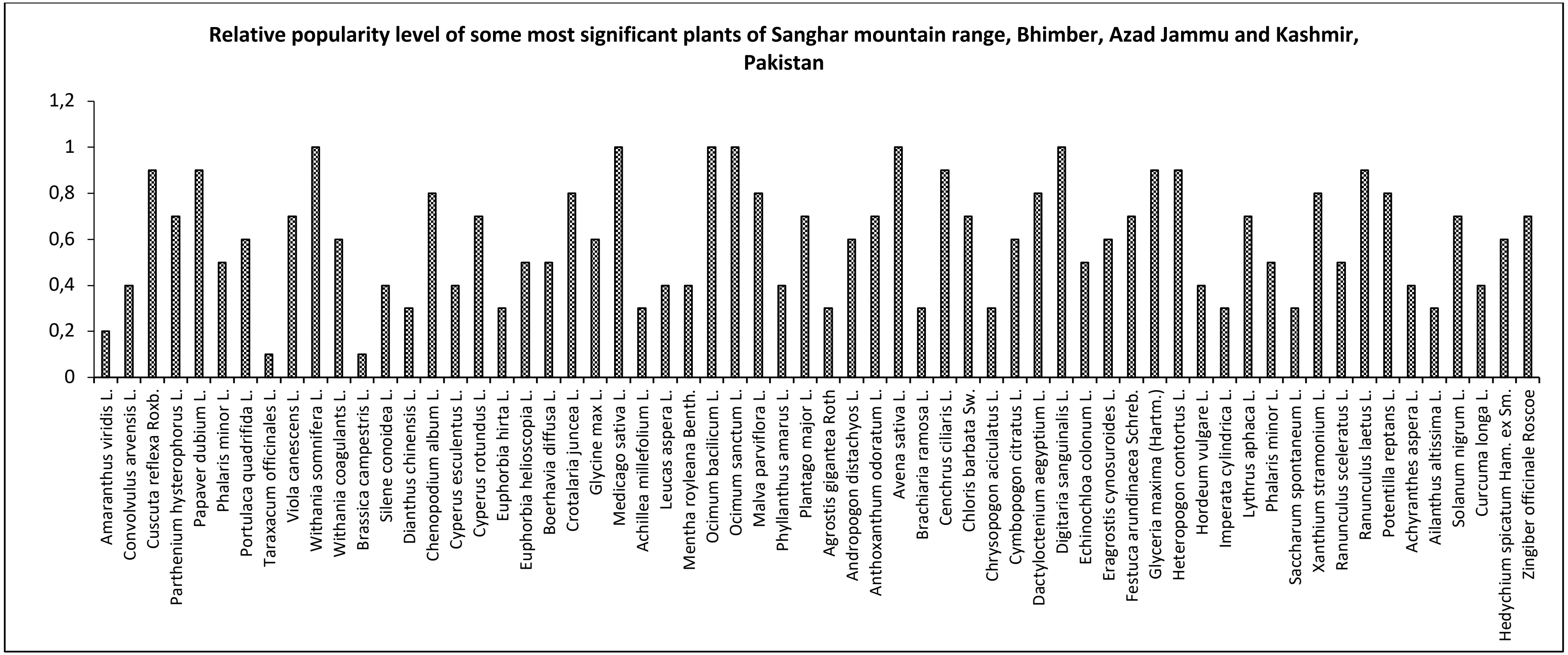

Figure 6. Relative popularity level of some plants reported in table 1. Relative popularity level is the relative percentage occurrence of the ailment in the family.

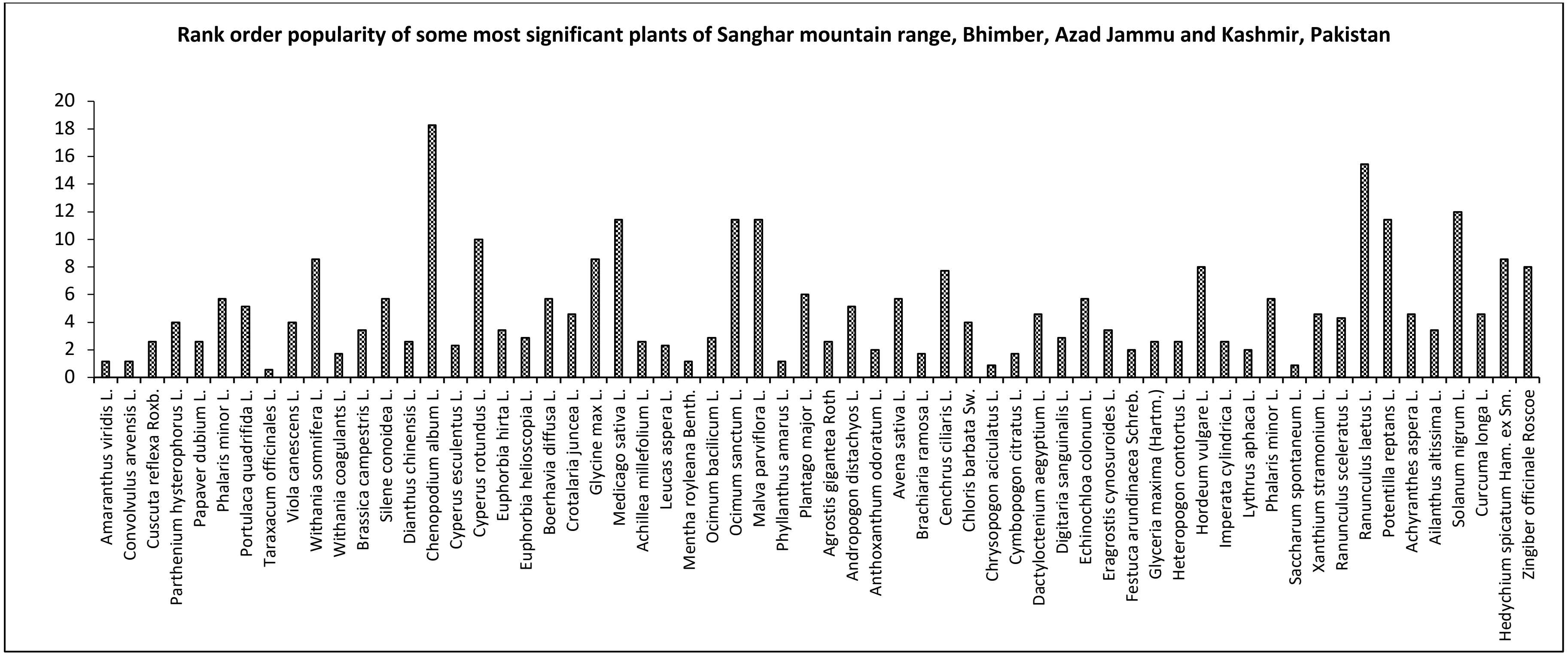

Figure 7. Rank order popularity of some plants reported in table 1. ROP=FL×RPL is the relative occurrence percentage considering both family and ailment frequency

The continuity of traditional healing practices across different regions and cultures underscores the accumulated wisdom and empirical knowledge passed down through generations. In the context of the above table, RPL (Relative Population Level) and ROP (Relative Overall Popularity) are additional indicators used to assess the importance of specific plants in traditional medicinal practices. RPL represents the proportion of informants who cited a particular plant for a specific ailment among all informants who mentioned any plant for that ailment. It helps gauge the relative importance of a plant within a specific ailment category. Higher RPL values suggest that a greater percentage of informants considered that particular plant as relevant to the ailment. For instance, *Withania somnifera* L. has an RPL of 1.0, implying that all informants who mentioned plants for ulcers cited this species, making it a prominent choice for ulcer treatments. On the other hand, ROP indicates the overall significance of a plant across all ailment categories, considering both its use citations and RPL values. Plants with higher ROP values are widely cited across multiple ailments and are considered more versatile in traditional medicinal practices. For example, *Medicago sativa* L. exhibits an ROP of 11.43, signifying its widespread use in various ailments, including wound healing. This makes it a highly versatile and valued plant in the traditional medicine system (Bibi *et al.* 2014; Abbasi *et al.* 2013; Shafi *et al.* 2021). The RPL and ROP values provide valuable insights into the specific and overall importance of each plant in the local medicinal practices. These metrics help researchers and practitioners identify key plant species that play a significant role in addressing specific health conditions as well as those that have broad-ranging applications in traditional healing practices.

This study aiming to explore the ethnobotanical and traditional ethnomedicinal uses of wild flora in the Sanghar mountains of District Bhimber, AJK, Pakistan, faces several limitations. The reliance on indigenous communities as informants may have introduced bias due to individual knowledge or interpretation of plant uses. Additionally, the study's focus on traditional medicinal uses may have overlooked other potential uses of the flora, such as culinary or industrial applications. The study's timeframe (2018-19) may also limit the generalizability of findings, as plant uses, and conservation statuses may change over time. Furthermore, the study's sample size of 248 plant species may not be representative of the entire flora of the region, potentially missing out on important plant species and uses. Finally, the conservation assessment was based on a semi-structured questionnaire covering anthropology, which may not provide a comprehensive understanding of the conservation status of the documented flora.

Conclusion

In conclusion, the exploration of traditional ethnobotanical knowledge (TEK) is crucial for uncovering the medicinal potential of wild indigenous plants. This research dealt with the TEK of herbal flora in District Bhimber, AJK, Pakistan. It identified 248 herbal species across 45 families, with Poaceae emerging as the most dominant family. These plants served a variety of purposes, from food and fodder to fuel. The traditional cultures of the area have long utilized these plants to address a range of ailments, including stomach problems, cough, cancer, jaundice, kidney diseases, diabetes, snake bites, and tooth problems. The study underscores the pressing need to safeguard the herbal flora of District Bhimber, given the looming threats of habitat loss, overgrazing, infrastructure development, and domestic land use. It emphasizes the value of exploring TEMs as a potential source of new drugs derived from wild indigenous plants. Ultimately, it advocates for the conservation of the region's flora to ensure their availability for future generations. Further studies in this area should consider a more diverse and inclusive approach to data collection, involving not only indigenous communities but also local botanists, conservationists, and other relevant stakeholders. A longitudinal study that spans several years could provide a more comprehensive understanding of the changing uses and conservation statuses of the flora in the Sanghar mountains. Additionally, a more extensive sampling strategy that covers a broader range of plant species could help identify overlooked species and uses. Lastly, incorporating advanced conservation assessment techniques, such as field surveys and satellite imagery analysis, could provide a more accurate and up-to-date assessment of the conservation status of the flora.

Declarations

Ethic statement: Prior verbal consent was taken from all the participants.

Data availability: The original data has been presented in the article. There is no supplementary data.

Funding: This research did not receive funding.

Contribution of Authors: MI, MM and IH designed the study; KHB and AG conducted the fieldwork, MI, HK and MWM conducted the main statistical analysis; MWM and HK wrote the manuscript, AG, KHB, MM and IH revised the data analysis and the manuscript; all authors read, corrected, and approved the manuscript.

Conflict of interest: Not applicable

Acknowledgements

The authors are thankful to the local people of the area who graciously participated in the interview and provided data of ethnomedicines. The project is not supported by any funding agency. The authors of MUST and AJKUoB are highly thankful to Turkish Cooperation and Coordination Agency (TIKA), Islamabad for providing resources and funding for establishment of Climate Change Research Centre (CCRC), Herbarium and Biodiversity Conservation Laboratory in Department of Botany of MUST, with facilities of research on Climate changes and sustainable agriculture development.

Literature cited

Abbasi AM, Khan SM, Ahmad M, Khan MA, Quave CL, Pieroni A. 2013. Botanical Ethnoveterinary Therapies in Three Districts of the Lesser Himalayas of Pakistan. Journal of Ethnobiology and Ethnomedicine 9(1):84.

Ahmad I, Ibrar M, Ali N. 2011. Ethnobotanical Study of Tehsil Kabal, Swat District, KPK, Pakistan. Journal of Botany 2011:368572. https://doi.org/10.1155/2011/368572.

Ajaib M, Haider SK, Zikrea A, Siddiqui MF. 2014. Ethnobotanical Studies of Herbs of Agra Valley Parachinar, Upper Kurram Agency, Pakistan. International Journal of Biology and Biotechnology 11(1):71-83.

Ajaib M, Islam A, Siddiqui MF. 2016. A Contribution to Ethnobotanical Study of Wild Plants of Tehsil Jatlan Azad Jammu and Kashmir. FUUAST Journal of Biology 6(2):247-256.

Amjad MS, Arshad M, Qureshi R. 2015. Ethnobotanical Inventory and Folk Uses of Indigenous Plants from Pir Nasoora National Park, Azad Jammu and Kashmir. Asian Pacific Journal of Tropical Biomedicine 5(3):234-241.

Bibi T, Ahmad M, Tareen RB, Tareen NM, Jabeen R, Rehman S, et al. 2014. Ethnobotany of Medicinal Plants in District Mastung of Baluchistan Province-Pakistan. Journal of Ethnopharmacology 157(1):79-89.

Bussmann RW. 2002. Ethnobotany and Biodiversity Conservation. In Modern Trends in Applied Terrestrial Ecology, pp. 343-360. Springer, Boston, MA.

Farooq S, Barki A, Yousaf KM, Fazal H. 2012. Ethnobotanical Studies of the Flora of Tehsil Birmal in South Waziristan Agency, Pakistan. Pakistan Journal of Weed Science Research 183.

Gillani SW, Ahmad M, Zafar M, Haq SM, Waheed M, Manzoor M, Shaheen H, Sultana S, Rehman FU, Makhkamov T. 2024. An Insight into Indigenous Ethnobotanical Knowledge of Medicinal and Aromatic Plants from Kashmir Himalayan Region. Ethnobotany Research and Applications 28:1-21.

Hameed M, Shafique K, Kayani WK, Hameed M, Ahmad F, Nawaz T. 2012. Floristic Diversity and Ethnobotany of Sensa, District Kotli, Azad Jammu and Kashmir Pakistan. Pakistan Journal of Botany 44(1):195-201.

Husain ZS, Malik RN, Javaid M, Bibi S. 2008. Ethnobotanical Properties and Uses of Medicinal Plants of Morgha Biodiversity Park, Rawalpindi. Pakistan Journal of Botany 40(5):1897-1911.

Hussain F, Khaliq A. 1996. Ethnobotanical Studies of Some Plants of Dabragai Hills, Swat. Proc. First Train. Workshop Ethnobot. Appl. Conserv., NARC, Islamabad, pp. 207-215.

Hussain J, Muhammad Z, Ullah R, Khan FU, Khan IU, Khan N, Ali J, Jan S. 2012. Evaluation of the Chemical Composition of Sonchus eruc and Sonchus asper. Journal of American Science 6(9):231-235.

Ilker U, Suleyman B, Nurettin Y, Yunus D. 2009. The Investigation and Quantitative Ethnobotanical Evaluation of Medicinal Plants Used around Izmir Province, Turkey. Journal of Medicinal Plants Research 3(8):345-367.

Ishtiaq M, Hanif W, Khan MA, Ashraf M, Butt AM. 2007a. An Ethnomedicinal Survey and Documentation of Important Medicinal Folklore Food Phytonims of Flora of Samahni Valley, Azad Kashmir Pakistan. Pakistan Journal of Biological Sciences 10(13):2241-2256.

Ishtiaq M, Khan MA, Hanif W. 2006. An ethnomedicinal inventory of plants used for family planning and sex diseases treatment in Samahni valley, A.K. Pakistan. Pakistan Journal of Biological Sciences 9(19):2546-2555.

Ishtiaq M, Maqbool M, Ajaib M, Ahmed M, Hussain I, Khanam H. 2021. Ethnomedicinal and folklore inventory of wild plants used by rural communities of valley Samahni, District Bhimber Azad Jammu and Kashmir, Pakistan. PLoS ONE 16(1):e0243151. https://doi.org/10.1371/journal.pone.0243151.

Ishtiaq M, Maqbool M, Hussain T, Azam S, Mushtaq W. 2016. Ethnomedico profile of indigenous flora of Tehsil Barnala, district Bhimber, Pakistan. Journal of Medicinal Plants 32(1):97-104.

Ishtiaq M, Maqbool M, Hussain T, Shah A. 2013. Role of indigenous knowledge in biodiversity conservation of an area: a case study on tree ethnobotany of Soona valley, district Bhimber Azad Kashmir. Pakistan Journal of Botany 45SI:157-164.

Ishtiaq M, Maqbool M, Hussain T, Shah A. 2013. Role of indigenous knowledge in biodiversity conservation of an area: A case study on tree ethnobotany of Soona Valley, District Bhimber Azad Kashmir, Pakistan. Pakistan Journal of Botany 45(157):245-256.

Ishtiaq M, Maqbool M, Hussain T. 2012. Interrelationship of cultural diversity and biodiversity and its impact on conservation. Pakistan Journal of Botany 44(4):245-256.

IUCN. 2001. IUCN Red List Categories and Criteria: version 3.1. IUCN species survival commission. IUCN, Gland, Switzerland and Cambridge, UK.

Ju Y, Zhuo J, Liu B, Long C. 2013. Eating from the wild: diversity of wild edible plants used by Tibetans in Shangri-la region, Yunnan, China. Journal of Ethnobiology and Ethnomedicine 9(1):28.

Kayani S, Ahmad M, Gillani SW, Manzoor M, Rehman FU, Jabeen S, Butt MA, Babar CM, Shah SAH. 2024. Ethnomedicinal appraisal of the medicinal flora among the sub-alpine and alpine indigenous communities of Palas Valley Kohistan, Northern Pakistan. Ethnobotany Research and Applications 28:1-29.

Khan KY, Khan MA, Shah GM, Hussain I. 2011. Ethnomedicinal uses of Genus Ficus in Pakistan. Journal of Applied Pharmaceutical Science 1(6):209-211.

Khan MA, Khan MA, Hussain M. 2012. Ethnoveterinary medicinal uses of plants of Poonch valley Azad Kashmir. Pakistan Journal of Weed Science Research 18(4):495-507.

Kousar S, Khan N, Abbas Z, Harun N, Ishaq K, Khan T, Bussmann RW. 2023. Documenting the wild edible plant's resources used by Pushtoons, Balochis and Brahvis as survival strategy in the arid Province of Balochistan, NW Pakistan.

Leto C, Tuttolomondo T, La Bella S, Licata M. 2013. Ethnobotanical study in the Madonie Regional Park Central Sicily, Italy; medicinal use of wild shrub and herbaceous plant species. Journal of Ethnopharmacology 146(1):90-112.

Mahmood A, Qureshi RA, Mahmood A, Sangi Y, Shaheen H, Ahmad I. 2011. Ethnobotanical survey of common medicinal plants used by people of district Mirpur, AJK, Pakistan. Journal of Medicinal Plants Research 5(24):4493-4498.

Manzoor M, Ahmad M, Zafar M, Gillani SW, Shaheen H, Pieroni A, Al-Ghamdi AA, Elshikh MS, Saqib S, Makhkamov T, Khaydarov K. 2023. The local medicinal plant knowledge in Kashmir Western Himalaya: a way to foster ecological transition via community-centred health seeking strategies. Journal of Ethnobiology and Ethnomedicine 19(1):56.

Maqbool M, Ajaib M, Ishtiaq M, Azam S. 2019. Ethnomedicinal study of plants used in phytotherapeutics among indigenous communities of district Bhimber, Azad Kashmir and migrants to United Kingdom. Proceedings of the Pakistan Academy of Sciences. B. Life and Environmental Sciences 56(2):55-74.

Mirzaman Z, Kayani S, Manzoor M, Jameel MA, Waheed M, Gillani SW, Babar CM, Bussmann RW. 2023. Ethnobotanical study of Makra Hills district Muzaffarabad, Azad Jammu and Kashmir, Pakistan. Ethnobotany Research and Applications 26:1-17.

Mughal R. 2016. Taxonomical studies on arboreal flora of Poonch district in JandK state India. Journal of Pleione 11(1):367-388.

Mugisha MK, Asiimwe S, Namutebi A, Borg-Karlson A-K, Kakudidi EK. 2014. Ethnobotanical study of indigenous knowledge on medicinal and nutritious plants used to manage opportunistic infections associated with HIV/AIDS in western Uganda. Journal of Ethnopharmacology 155(1):194-202.

Nasir E, Ali SI. 1970-1995. Flora of West Pakistan and Kashmir. Pakistan Agriculture Research Council, Islamabad, Karachi University Printing Press.

Pardhi P, Jain AP, Ganeshpurkar A, Rai G. 2010. Anti-microbial, anti-oxidant and anthelmintic activity of crude extract of Solanum xanthocarpum. Pharmacognosy Journal 2(11):400-404.

Qureshi R, Bhatti GR. 2008. Ethnobotany of plants used by the Thari people of Nara Desert, Pakistan. Fitoterapia 79(6):468-473.

Qureshi R. 2004. Floristic and ethnobotanical study of desert Nara region, Sindh. Department of Botany, Shah Abdul Latif University, Khairpur, Sindh, Pakistan. Ph.D. Thesis, Vol. I: 1-300.

Rahim S, Shah A, Iqbal S. 2023. Ethnobotany of medicinal plants in Surghar Range of Pakistan. Ethnobotany Research and Applications 26:1-72.

Rehman S, Iqbal Z, Qureshi R, Shah GM. 2023. Quantitative ethnobotanical study of medicinal plants used by the indigenous communities of Shawal Valley, District North Waziristan, Pakistan. Ethnobotany Research and Applications 25:1-24.

Shafi F, Mirza SA, Shakoor A. 2021. An Ethnomedicinal Study of Some Wild Plants Growing Near Mangla Lake, District Mirpur, AJK. International Journal of Plant Science and Phytomedicine 11:62-86.

Shah IA, Burni T, Badshah L, Uza NU, Bussmann RW. 2023. Quantitative ethnobotanical study and conservation status of herbal flora of Koh-e-Suleman range, Razmak valley, North Waziristan, Pakistan. Ethnobotany Research and Applications 25:1-18.

Shaukat SA, Shah ZA, Ahmad MJ, Shaukat SK, Shoukat SW. 2012. Ethnobotanical studies of some medicinal plants of Union Council Bangoin, Tehsil Rawalakot Azad Kashmir. Science Journal of Agriculture 14:105-109.

Sheikh N, Kumar Y, Misra AK, Pfoze L. 2013. Phytochemical screening to validate the ethnobotanical importance of root tubers of Dioscorea species of Meghalaya, North East India. Journal of Medicinal Plants 16:62-69.

Shinwari MI, Khan MA. 2000. Folk use of medicinal herbs of Margalla hills national park, Islamabad. Journal of Ethnopharmacology 69(1):45-56.

Shinwari MI, Khan MA. 2011. Folk use of medicinal herbs of Margalla Hills National Park, Islamabad. Journal of Ethnopharmacology 69:45-56.

Song MJ, Kim H, Heldenbrand B, Jeon J, Lee S. 2013. Ethnopharmacological survey of medicinal plants in Jeju Island, Korea. Journal of Ethnobiology and Ethnomedicine 9:48.

Thind S, Hussain I, Bhatti KH, Zahid S, Parveen A. 2021. Ethnobotanical, Phytochemical and Floristic Screening of Selected Species of Family Lamiaceae District Mirpur, AJandK. International Journal of Plant Science and Phytomedicine 11:134-158.

Umair M, Altaf M, Abbasi AM. 2017. An ethnobotanical survey of indigenous medicinal plants in Hafizabad district, Punjab-Pakistan. PLoS ONE 12(6):1-22.

Vijayakumar S, Yabesh JM, Prabhu S, Manikandan R, Muralidharan B. 2015. Quantitative ethnomedicinal study of plants used in the Nelliyampathy hills of Kerala, India. Journal of Ethnopharmacology 161:238-254.

Vitalini S, Iriti M, Puricelli C, Ciuchi D, Segale A, Fico G. 2013. Traditional knowledge on medicinal and food plants used in Val San Giacomo Sondrio, Italy - An alpine ethnobotanical study. Journal of Ethnopharmacology 145:517-529.

Supplementary data

Plants were arranged into different conservation classes using IUCN (2001) criteria as given in Table S1.

Table S1. Conservation classes of plants.

Conservation class	**Number**	**Denotes**
Plant availability	1	Very rare
	2	Rare
	3	Occasional
	4	Abundant
Collection	0	More than 1000 kg/year
	1	Consumed from 500-1000 kg/ year
	2	Consumed from 200-500 kg/year
	3	Consumed from 100-200 kg/year
Growth	0	Re-growth in more than 3 years
	1	Re-growth in 3 years
	2	Re-growth in 2 years
	3	Re-growth in 1 year
	4	Re-growth in a season
Part used	0	Whole plant/roots
	1	Bark
	2	Fruits/seeds
	3	Flowers
	4	Latex/Gum/Leaves
Total score	1	0-4 Endangered
	2	5-8 Vulnerable
	3	9-12 Rare
	4	13-14 Infrequent
	5	15-16 Dominant

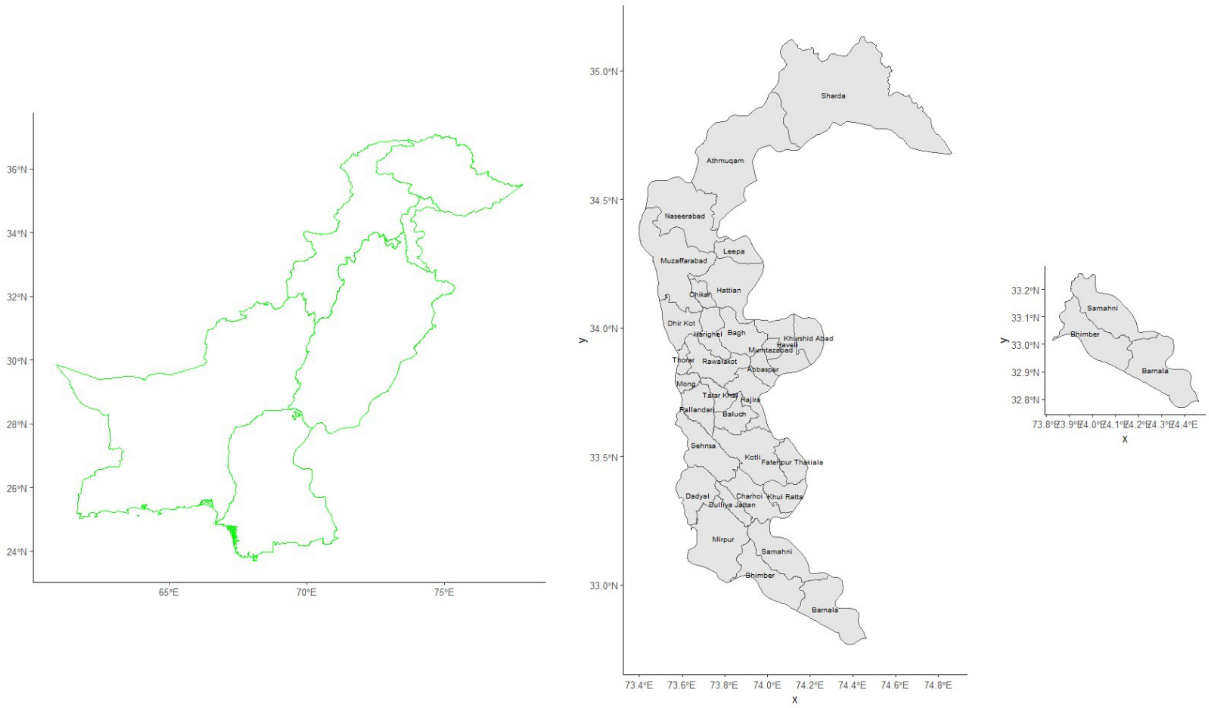

Figure 1S. Supplementary map of the study area Sanghar, Bhimber Azad Jammu and Kashmir, Pakistan