Traditional Therapeutic Uses of Medicinal Plants among the People of Rustam Region, Mardan, Khyber Pakhtunkhwa

Sayyed Muhammad Hanif*, Nadeem Ahmad†, Syed Mukaram Shah‡ Abdul Razzaq§, Muhammad Nauman Khan**

Abstract

The present study documents the indigenous knowledge of plant resources in Qamarabad, Rustam, District Mardan. A total of 64 plant species, belonging to 38 families, are recorded, including 40 herbs, 3 shrubs, 21 trees, and 4 climbers. The utilized plant parts varied from leaves, roots, stems, tubers, fruits, seeds, bulbs, gum, and the whole plant. The most represented families are Mimosaceae, Asteraceae, Brassicaceae, and Solanaceae, among others. These plants are traditionally used to treat various health conditions such as diarrhea, diabetes, jaundice, backache, stomach problems, cough, asthma, and skin diseases. In addition to their medicinal uses, many plants served as sources of fuel, fodder, timber, and furniture. The economic significance of these medicinal plants is also highlighted.

Keywords: District Mardan, Medicinal plants, Ethnobotany, Traditional Plant knowledge.

Introduction

Medicinal plants have been an essential part of human healthcare since ancient times, providing therapeutic compounds to treat various diseases (Nostro et al., 2000). Currently, about 80% of the world's population, especially in developing countries, relies on plant-based medicines as their primary source of healthcare (WHO, 1993). Plants used in traditional medicine are often based on indigenous knowledge passed down through generations, and the inhabitants of specific regions have vast experience with local flora for medicinal, nutritional, and other utilitarian purposes (Acharya et al., 2010). The World Health Organization (WHO) estimates that approximately 90% of people in developing countries depend on herbal medicine for their basic healthcare needs (WHO, 2002). The increasing popularity of medicinal plants can be attributed to their lack of side effects, ease of accessibility, affordability, and, in some cases, the absence of alternative modern healthcare systems

* Department of Botany, University of Peshawar, Peshawar 25120, Pakistan, sayyedhanif653@gmail.com
† Department of Botany, University of Peshawar, Peshawar 25120, Pakistan, drnadeemgul@uop.edu.pk
‡ Centre of Plant Biodiversity, University of Peshawar, Peshawar 25120, Pakistan, shahcpb@uop.edu.pk
§ Qarshi University, Lahore 54000, Pakistan, abdul.razzaq@qarshi.com
** Corresponding Author: Department of Botany, Islamia College Peshawar, Peshawar 25120, Pakistan, nomiflora@uop.edu.pk

(Acharya et al., 2009). Despite technological advancements, the loss of indigenous knowledge related to medicinal plants presents a significant challenge, as this traditional wisdom is crucial for the development of plant-based therapeutic treatments (Mennis, 2006).

Pakistan, a country located between 60° 55’ to 75° 30’ East longitude and 23° 45’ to 36° 50’ North latitude, boasts a diverse range of ecological regions and climatic conditions that support rich biodiversity. It is estimated that Pakistan has around 6000 species of phanerogams, with approximately 200 herbal drugs traded locally and 75 crude herbal drugs exported internationally. Indigenous people collect about 85% of these herbs from the wild (Shinwari and Qureshi, 2011).

Traditional medicine systems such as Ayurveda and Unani have deep roots in the Indian subcontinent. While Ayurveda emerged around 2500 B.C. and is practiced by the Hindu community, the Unani system, later adopted by Muslim communities, became the dominant form of traditional medicine in Pakistan. Today, over 50,000 practitioners of Unani medicine, known as Hakims, serve various parts of Pakistan of Pakistan's 2,000 medicinally important species, 400-600 are documented for their therapeutic uses (Shinwari and Gilani, 2003). In remote areas, local populations continue to rely on their knowledge of medicinal plants due to limited access to modern healthcare and a preference for plant-based remedies that are free from side effects.

Ethnobotany, the study of the relationships between people and plants, examines how different cultures use plants for food, medicine, shelter, clothing, and other needs. Ethnobotanical studies focus on understanding the cultural, biological, and economic interactions between communities and their local flora (Qureshi et al., 2007). These studies contribute significantly to the knowledge of plant biodiversity and play a key role in the conservation of natural resources, providing a foundation for future scientific and social interventions. Medicinal plants in Pakistan, including those from the Mardan District, have been successfully used to treat various ailments. Despite the increasing availability of synthetic drugs, the use of medicinal plants persists due to their effectiveness and lack of adverse effects (Govaerts, 2001). However, Mardan, particularly the Rustam region, remains underexplored from an ethnobotanical perspective, with only a few notable studies conducted in the area (Begum et al., 2013). This study is an innovative study that combines the traditionally used plants in the Rustam region and their economic values. Because of this, presented study aims to document the indigenous knowledge and utilization of medicinal plants in Qamarabad, Rustam, providing an ethnobotanical inventory and examining the economic and cultural significance of these plants.

Methodology

Research Area Description

Mardan is a city and the headquarters of Mardan District in Khyber Pakhtunkhwa Province, Pakistan (Figure 1). Mardan is the 19th largest city of Pakistan. It is the de-facto headquarters of the Yousafzai tribe, Syed tribe although a significant number of rural people have settled there over the past years (Shah et al., 2017). The district Mardan is the second most populous city in the province and lies from 34° 05’ to 34° 32’ North latitudes and 71" 48’ to 72° 25’ East longitudes. It is bounded on the north by Buner district and Malakand protected area, on the east by Sawabi and Bunir districts, on the south by Nowshehra district and on the west by Charsadda district and Malakand protected area. The Karamar and Kashmir Smasta is also present in south and north area is also present in Rustam. The total area of the district is 1632 square kilometers (GoP, 1998; Ibrahim et al., 2019). Rustam, located in the Mardan district of Khyber Pakhtunkhwa, Pakistan, is a valley renowned for its historical and agricultural significance.

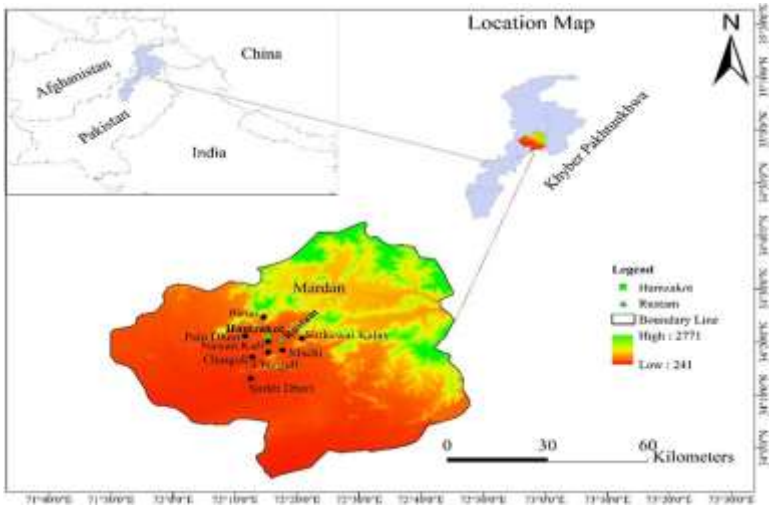

Figure 1: Map of Rustam Qamarabad Nawan killi, District Mardan.

The area is famous for its agricultural products such as mustard oil and oranges, with the surrounding landscape characterized by both arid and fertile zones. Favorable edaphic and climatic factors help in the distribution and establishment of plant communities (Khan et al., 2014). The site is celebrated for its unique architecture, spiritual ambiance, and the calmness it imparts to visitors. In terms of flora, Rustam is home to a

diverse range of plant species, from spiny shrubs and herbs to deciduous trees. The vegetation of the area, though sparse in some parts, is of significant importance to the local community, especially for medicinal and agricultural purposes. Some of the native plant species include *Calotropis procera*, *Acacia arabica*, *Saccharum officinarum*, *Ziziphus oxyphylla*, *Populus alba*, and *Mentha spicata*. These plants are not only vital for the ecosystem but also play a critical role in the traditional medicine system practiced by the local communities. Plants provide ecosystem services like oxygen, water and food (Ahmad et al., 2019).

Field Surveys and Plant Collection

Field surveys are conducted from 2019 to 2020 during different seasons (April-June) to collect medicinal plants. Collected with flowering plants, seeds, and bulbs if they are bulbs, allowing identification. Plant specimens are collected from various habitats and locations within the study area. Standard botanical collection methods are used, including pressing, drying, and preserving specimens for further identification and documentation. Some of these plants shown in Figure 2.

Figure 2: Appearances of some of the species identified in the study in nature. A- B. oleraceae, B- M. jalaba, C- R. dentatus, D- V. thapsus, E- F. religiosa, G- E. camaldulensis, H- C. arvensis, I- A. lebbeck.

Plant Identification

The collected plant specimens are identified by comparing them with herbarium specimens at the Department of Botany, University of Peshawar. Plant identification is also assisted by using relevant botanical literature and taxonomic keys. With the help of FOP-flora of Pakistan (http://www.efloras.org/flora_page.aspx?flora_id=5), all botanical taxa are identified, monographs related to FOP-flora of Pakistan (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2020; Ali & Qaiser, 1986; Harriman, 2004; Stewart, 1961, 1972), Topicos (https://tropicos.org/). After identification, the plant specimens are deposited at the department of Botany Herbarium (PUP), University of Peshawar, Pakistan.

Ethnobotanical Data Collection

Ethnobotanical data are gathered through direct interviews and informal discussions with local people, focusing primarily on elderly individuals (aged 50 and above) who possess extensive knowledge about traditional plant use. A semi-structured questionnaire is designed to collect information on the following:

1. Local names of plants
2. Parts of plants used for medicinal purposes
3. Methods of preparation and administration
4. Ailments treated
5. Additional uses (e.g. fuel, fodder, timber)

Informants are selected based on their willingness to share knowledge, with priority given to those whose medicinal recipes are corroborated by at least five individuals. The interviews are conducted in local languages and dialects, ensuring that cultural context and details are accurately captured (Table 1).

Processing of Plant Specimens

After collection, plant specimens are pressed using a plant press and dried between blotting paper. Once dried, the specimens are mounted on herbarium sheets and labeled with information about the plant's locality, collection date, and ethnobotanical uses. The herbarium specimens are then stored at the Department of Botany, University of Peshawar (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2020).

Data Validation and Analysis

The ethnobotanical data are systematically documented, and only the information that is verified by multiple informants is included in the

final analysis. Data are analyzed qualitatively, with emphasis on the frequency of plant use and the consistency of the reported medicinal applications. The collected information is compared with existing ethnobotanical studies to validate the findings.

Table 1. Plant species reported from Rustam Qamarabad Nawan Killi, District Mardan.

S. No.	Botanical name	Local name	Family name	Habit	Part used	Uses
1	*Abelomuschus esculentus*	Bhindi	Malvaceae	Herb	Fruit	As an emollient, demulcent and diuretic
2	*Acacia modesta* Wall.	Palosa	Mimosaceae	Tree	Gum	As a blood purifier
3	*Acacia nilotica* L.	Kikar	Mimosaceae	Tree	Aerial parts	Stomachache and diarrhea
4	*Ailanthus altissima* (Mill.) Swingle	Bakyanra	Simaroubaceae	Tree	Aerial parts	For opthalmia dysentery and gastrisits intestinal
5	*Albizia lebbeck* (L.) Benth.	Sreekh	Mimosaceae	Tree	Bark	Cough, eye infection and flu
6	*Allium cepa* Mill.	Piyaz	Alliaceae	Herb	Bulb and leaves	Carminative expectorant stimulant and piles
7	*Allium sativum* L.	Ooga	Liliaceae	Herb	Bulb and leaves	Blood pressure and diarrhea
8	*Alocacia macrorrhiza*	Kachalo	Araceae	Herb	Tuber, leaves	Anticancer and in hepatic injury
9	*Aloe vera* L.	Amzary	Liliaceae	Herb	Leaves	Skin diseases
10	*Brassica campestris* L.	Sharsham	Brassicaceae	Herb	Seed and leaves	Oil is obtained used as hair restorer, Rubifacient
11	*Brassica oleracea* L.	Goopy	Brassicaceae	Herb	Aerial parts	Antioxidant dietary fiber source of vitamin k and c
12	*Calotropis procera* (Aiton) Dryand.	Spalmai	Asclepiadaceae	Shrub	Leaves and fruit	Ear pain, snake bite, cough, ring worm
13	*Cannabis sativa* L.	Bang	Canabinaceae	Herb	Fruit and leaves	Headache, jaundice, Toothache
14	*Capsicum fruitescens* L.	Marchaki	Solanaceae	Herb	Fruit	Stimulant and food flavoring
15	*Cassia fistula* L.	Amal thas	Caesalpinaceae	Tree	Fruit	Abdominal pain, diarrhea
16	*Cichorium intybus* L.	Kashni	Asteraceae	Herb	Root, leaves	Tonic, astringent and increase bile secretion
17	*Citrus lemon* (L.) Burm.	Nembo	Rutaceae	Small tree	Fruit	Antiseptic, stomachache and influenza
18	*Cnicus benedictus* (L.) L.	Shoda pai	Asteraceae	Herb	Leaves	Anti-poison, asthma
19	*Convolvulus arvensis* L.	Prewati	Convolvulaceae	Climbing herb	Whole plant	Blood purifier, anti-dandruff and skin diseases
20	*Coriandrum sativum* L.	Dhania	Apiaceae	Herb	Leaves and stem	As pain killer, also used in chitins
21	*Cucurbita maxima* Duchesne	Kado	Cucurbitaceae	Herb	Leaves and fruit	Anti-diabetic, hyperlipidemia
22	*Cuscuta reflexa* Roxb.	Zilay	Cuscutaceae	Parasite herb	Whole plant	Anti-vomiting and paralysis
23	*Dalbergia sisso* Wight & Arn.	Shawa	Papilionaceae	Tree	Leaves root and wood.	Stimulant astringent and leprosy
24	*Datura stramonium* L.	Datura	Solanaceae	Herb	Leaves and fruit	Asthma, abdominal pain ,cough
25	*Dodonaea viscosa* Jacq.	Ghwarski	Sapindaceae	Shrub	Leaves	Leaves are used on wounds
26	*Eriobotrya japonica* (Thunb.) Lindl.	Lokat	Rosaceae	Tree	Fruit	Used as expectorant

27	*Eucalyptus camaldulensis* Dehnh.	Lachi	Myrtaceae	Tree	Leaves	As a flavoring agent and in asthma
28	*Euphorbia helioscopia* L.	Peryan dolai	Euphorbiaceae	Herb	Whole plant	Purgative and poisonous
29	*Ficus carica* L.	Enzar	Moraceae	Tree	Fruit, leaves and branches.	Piles and constipation
30	*Ficus religiosa* L.	Peepal	Moraceae	Tree	Leaves and stem	As vermicide, asthma and cough
31	*Foeniculum vulgare* Mill.	Kaga	Apiaceae	Herb	Fruit	Intestinal colic ,vomiting, heart burn
32	*Helianthus annus* L.	Nwar paras	Asteraceae	Herb	Seed	Cold, cough and heart diseases
33	*Hordeum vulgare* L.	Warbashi	Poaceae	Herb	Whole plant.	Dyspepsia
34	*Luffa cylindrical* L.	Tory	Cucurbitaceae	Climbing herb	Fruit	For ulcer
35	*Lycopersicon esculentum* Mill.	Tamater	Solanaceae	Herb	Fruit	Urinary disorder and eye sight improvement
36	*Melia azadarch* Mill.	Tora Bakyanra	Meliaceae	Tree	Fruit leaves and wood.	As an anthelmintic and rheumatism
37	*Mentha arvensis* L.	Podina	Lamiaceae	Herb	Leaves	Gas trouble, indigestion
38	*Mirabilis jalapa* L.	Gully basi	Nyctaginaceae	Herb	Leaves	Chest pain and pain
39	*Momordica charantia* L.	Kareela	Cucurbitaceae	Climbing herb	Fruit	Diabetes, disease of spleen and liver
40	*Morus alba* L.	Toot	Moraceae	Tree	Fruit	Emollient, purgative and laxative
41	*Nasturtium officinal* R.Br.	Thermera	Brassicaceae	Herb	Whole plant	Tuberclosis,anemia,urinary Disorders
42	*Origanum vulgare* L.	Shamake	Lamiaceae	Herb	Leaves	Diabetes and fever
43	*Papaver somniferum* L.	Doda	Papaveraceae	Herb	Seed and fruits	Used against cough and cold
44	*Plantago lanceolate* L.	Isphagul	Plantaginaceae	Herb	Seed and leaves	Used as tonic, fever and dysentery
45	*Populus* sp.	Sufaidar	Salicaceae	Tree	Stem and leaves	As a fodder and preparation of game tools
46	*Prunus domestica* L.	Alochi	Rosaceae	Tree	Fruit	Laxative, also used in leucorrhea
47	*Psidium guajava* L.	Amrood	Myrtaceae	Tree	Leaves, Fruit and bark.	Laxative, dysentery and digestive disorder
48	*Punica granatum* L.	Anar	Punicaceae	Tree	Fruit	Blood purifier, astringent
49	*Raphanus sativus* L.	Mulay	Brassicaceae	Herb	Underground part	Asthma, chest pain
50	*Ricinus communis*	Randa	Euphorbiaceae	Tree	Fruit and flower	Snake bite
51	*Rumex dentatus* L.	Shalkhi	Polygonaceae	Herb	Leaves	Leaves are used to prevent vegetables from deterioration
52	*Salvia plebeia* R.Br.	Gwamlay	Acoraceae	Herb	Seeds	Seeds are used in gur sharbat for bleeding diarrhea
53	*Solanum melongena* L.	Batengar	Solanaceae	Herb	Fruit,leaves,seed	Stimulant
54	*Solanum nigrum* Lesch. ex Dunal	Kachmachu	Solanaceae	Herb	Fruit	Swelling and skin diseases
55	*Spinacia oleracea* L.	Palak	Chenopodiaceae	Herb	Whole plant	Used in inflammation of liver lung and bowels
56	*Syzygium cumini* (L.) Skeels	Jamo	Myrtaceae	Tree	Fruit and leaves	Stomachache diuretic carminative and diabetes
57	*Tamarix indica* Willd.	Ghaz	Tamaricaceae	Tree	Bark and leaves	Used on burnt region and toothache
58	*Trifolium pratense* L.	Shotal	Papilionaceae	Herb	Dried flower	Cough, antiseptic and expectorant
59	*Verbascum thapsus* L.	Khar dag	Scrophulariaceae	Herb	Leaves and seed	As a fish poisons and in asthma
60	*Vitis vinifera* Mill.	Angoor	Vitaceae	Shrub	Fruit and leaves	As an astringent, laxative stomachache, demulcent

61	*Withania somnifera* (L.) Dunal	Kotilal	Solanaceae	Herb	Whole plant	Leucorrhea and rheumatism
62	*Xanthium strumarium* Lour.	Geshi	Asteraceae	Herb	Leaves	As blood purifier
63	*Zea mays* L.	Jowar	Poaceae	Herb	Leaves and fruit	As a source of food, also used in kidney stone problem
64	*Ziziphus mauritiana* Lam.	Bera	Rhamnaceae	Tree	Fruit and leaves	Blood purification and digestion

Results and Discussion

The present study documented the indigenous uses of 64 plant species belonging to 38 different families from the Qamarabad area of Rustam, District Mardan. The distribution of species according to families is shown in Figure 3. According to this data, the dominant families are clearly Solanaceae (6), Asteraceae (4), Brassicaceae (4), and Asteraceae (4). Pirbalouti et al. (2013) reviewed important ethnobotanical information on pharmaceutical plant uses. They reported that data on 122 species belonging to 49 botanical families are claimed for medicinal purposes.

This study focused on human medicinal plant uses, which represented 95% of pharmaceutical uses. They reported that the most widely represented family is Asteraceae. Shah et al. (2013) conducted ethnomedical research study in semi tribal hilly area between Mianwali District and Karak District. They reported that ethnomedical data consisted of 131 plant species belonging to 48 families. Amaranthaceae is the most widely represented. Bahmani et al. (2014) collected and documented information on anti-diabetic plants traditionally used for the treatment of diabetes in Urmia, Northwestern Iran. They used direct observation method and interviewed 35 traditional healers. They collected 30 medicinal plants from 17 families for the treatment of diabetes. They reported that the family with the highest number of plants is Lamiaceae. Ahmad and Pieroni (2016) conducted ethnobotanical data from Thakht-e-Sulamian hills of North-Western tribal belt of Pakistan. They documented a total of fifty-one wild food plant species belonging to twenty-eight families. Rosaceae is reported as the dominant family with the highest number of species.

Fazal et al. (2024) conducted a quantitative study of traditional medicinal plants of Koh Valley Chitral in Hindukush Range, Pakistan. In this study, they reported that the first family in terms of plant number is followed by Asteraceae with 14 plants, Rosaceae with 11 plants, Apiaceae with 7 plants, Solanaceae, Moraceae, Lamiaceae and Polygonaceae with 5 plants, Brassicaceae, Chenopodiaceae and Cucurbitaceae with 4 plants, Elaegnaceae with 3 species (in addition to the other families with two and one species each). Ullah et al. (2024)a conducted a quantitative ethnobotanical study of medicinal plants used by local communities in

Chamla Valley, Buner District, Pakistan. The study revealed that the vegetation composition of the recorded species is dominated by herbs (61%) (93 species), shrubs (20.9%) (32 species), trees (12.4%) (19 species) and climbers (6%) (9 species). Ullah et al. (2024)b conducted a study on the ethnomedicinal potential of indigenous plants of Northern Balochistan, Pakistan. In this study, they showed that most of the plant species belong to the families Fabaceae (16 species), Asteraceae (9 species), Apiaceae (7 species), Brassicaceae (5 species) and Lamiaceae (5 species). As can be seen, in many of the studies mentioned, different families are dominant. It can be said that this situation is related to the ecological, climatic and topographic structure in which the plants live.

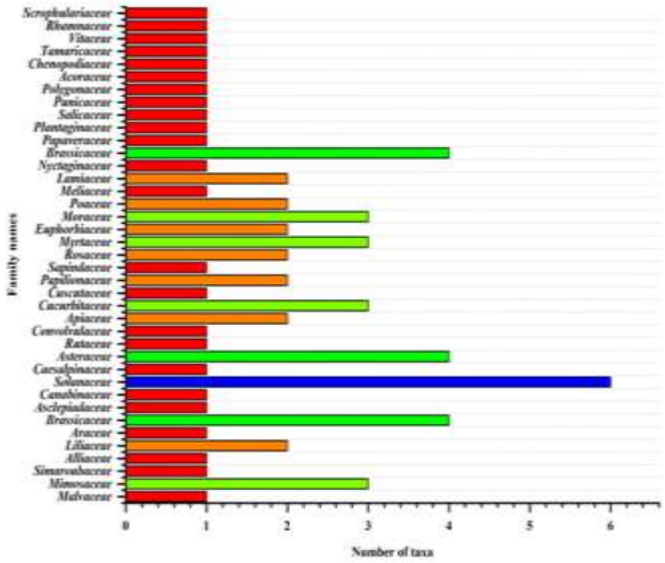

Figure 3. Bar chart of the distribution of plants according to their families.

Moreover, these plants included 36 herbs, 3 shrubs, 20 trees, and 3 climbing herb, 1 small tree, and 1 parasite herb (Figure 4). The recorded plant species are primarily used for medicinal purposes, although some are also utilized for fuel, fodder, timber, and furniture. The plant parts utilized included leaves, roots, stems, tubers, fruits, seeds, bulbs, gum, and the whole plant. The diversity of plant parts used highlights the extensive ethnobotanical knowledge of the local communities. Ghani et al. (2012) conducted an ethnobotanical study in Chapursan Valley. They emphasized that their main objective is to list the richness of medicinal plants. They collected 41 species belonging to 29 families of herbs, shrubs and trees which are used as medicinal plants by the inhabitants of the valley. Ullah

et al. (2015) in their study examining the diversity of life forms in the Sheikh Buddin National Park in Pakistan, they reported that there are 26 species of trees, 20 species of shrubs, 53 species of herbs, and 8 species of grasses.

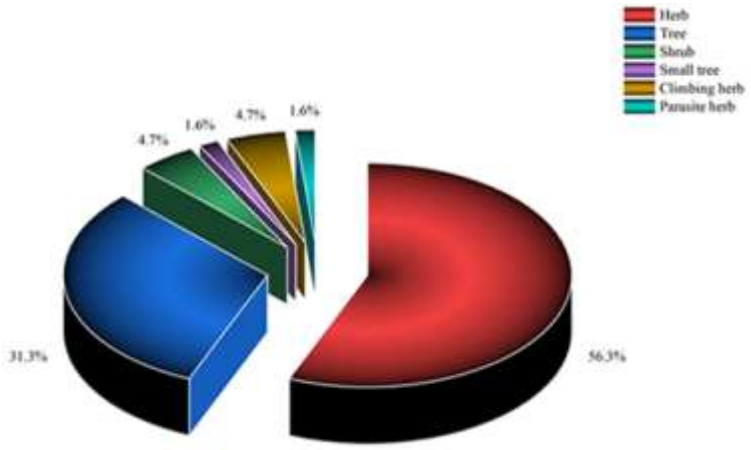

Figure 4: Pie chart of life forms of plants in their habitats

Qureshi et al. (2014) reported in their study on the vegetation diversity and plant life of Khanpur dam that herbs had a dominant share in the floristic composition with a contribution of 57.47%, followed by shrubs (14.03%), herbs (10.86%) and trees (9.50%), while the rest of the other 5 categories are in the range of 3.17-0.45%. conducted a quantitative study of traditional medicinal plants of Koh Valley Chitral in Hindukush Range, Pakistan. This research showed that herbs are the leading life form with 82(64%) species, followed by trees with 28(22%) species, shrubs with 12(9%), climbers with 4(3%) and vegetables with 2(1.5%) species. Ullah et al. (2024)a conducted a quantitative ethnobotanical study of medicinal plants used by local communities in Chamla Valley, Buner District, Pakistan. In this study, they reported that the Dicot group is dominated by Asteraceae with 11 species, followed by Lamiaceae, Amaranthaceae (7), Rosaceae and Euphorbiaceae (5 each) with 10 species, and Mimosaceae, Moraceae, Polygonaceae, Papilionaceae and Solanaceae (4 each). It can also be stated here that the life forms of the plants in living units may contain differences. This can give information about the richness of the regions.

Among the recorded species, the most represented families are Mimosaceae, Asteraceae, Brassicaceae, Solanaceae, Cucurbitaceae, Malvaceae, Vitaceae, Poaceae, and Rhamnaceae. The medicinal plants are predominantly used to treat common ailments such as diarrhea, diabetes, jaundice, backache, stomach problems, cough, asthma, and skin diseases.

The economic significance of these plants is also noted, with many species serving dual purposes as both medicinal remedies and sources of income or resources for the community.

The results of this ethnobotanical study reveal the rich traditional knowledge held by the people of Rustam, District Mardan, regarding the medicinal uses of local plants. A total of 64 plant species from 38 different families are reported, showcasing the area's botanical diversity. This knowledge, primarily transmitted orally from generation to generation, remains integral to the local healthcare practices, particularly in rural communities where access to modern healthcare is limited.

Majority of the documented plant species are used to treat common ailments such as digestive disorders (e.g. diarrhea, stomach aches), respiratory conditions (e.g. cough, asthma), skin diseases, and metabolic disorders such as diabetes. The high number of species used for treating stomach-related issues suggests that gastrointestinal disorders are prevalent in the community, which is consistent with the traditional dietary practices and the availability of herbal remedies. Species like *Mentha spicata*, *Ziziphus oxyphyla*, and *Saccharum officinarum* are among the most frequently cited for their effectiveness in treating these conditions.

Respiratory issues such as asthma and cough are also commonly treated with plants like *Adiantum* subsp. and *Papaver somniferum*. The use of these plants for respiratory relief underscores their pharmacological potential, as modern research has shown that many of these species contain bioactive compounds with anti-inflammatory and bronchodilatory properties.

In addition to their medicinal uses, many plants reported in this study had significant economic value. Species like *Acacia arabica* and *Ziziphus oxyphyla* are used not only for medicinal purposes but also for timber and fuel, which are essential resources in rural communities. The dual-purpose nature of these plants makes them indispensable to the local economy and lifestyle. Additionally, certain plants such as Rosa indica and Ficus carica are cultivated for ornamental purposes, further highlighting their cultural importance. Khan et al. (2025) conducted a study titled “In-depth investigation of the nutraceutical value and medicinal perspectives of wild medicinal plants in Ojhor Valley, Hindu Kush Range, Chitral district of Pakistan”. In this study, they conducted proximate analysis of 10 wild medicinal plants frequently used in the region. Khan et al. (2019) conducted an eco-taxonomic study of the Poaceae (Gramineae) family. A total of 51 taxa consisting of 34 genera, 5 subfamilies and 11 tribes are collected from the Charsadda District. They reported that the Panicoideae subfamily had the highest number of genera, taxa and tribes, followed by Pooideae. They emphasized that Poaceae is a diverse grass family with

great economic importance as it includes crops such as rice, maize, oat, wheat etc.

The most commonly used plant parts are leaves and fruits, which is consistent with findings from other ethnobotanical studies conducted in Pakistan (Umair et al., 2017). This could be due to the ease of collection and the fact that these parts are renewable, allowing for sustainable harvesting without damaging the plant.

The documentation of these 64 plant species and their uses highlights the urgent need for conservation efforts. Many of the species reported are threatened by overharvesting, habitat destruction, and climate change. Sustainable harvesting practices and the cultivation of medicinal plants are crucial for ensuring that these valuable resources remain available to future generations. Additionally, efforts to conserve the local flora can have far-reaching effects on both biodiversity and cultural heritage conservation (Shinwari & Gilani, 2003).

Numerous researchers, including Ullah et al. (2016), Jan et al. (2017) and Ahmad et al. (2019), have stated that most species that are comparable to ours are used as fodder, medicine, or for other purposes in their respective fields of study. However, Anisuzzaman et al. (2007) conducted an ethnobotanical study at Madhupur in Tangail district. During their study, 86 plant species belonging to 84 genera under 46 families are identified as having economic importance, out of which only their ethnomedicinal value is highlighted. Ibrar et al. (2007) collected 97 plant species from Ranyal Hills District of Shangla, Pakistan. They classified these plants on the basis of their traditional medicinal and economic uses. They noted that most of these plants have more than one local use. Marwat et al. (2012) conducted a research study to investigate the Socio-Economic Impacts of Dwarf Palm (Nannorhops ritchieana) and Date Palm (Phoenix dactylifera) on the local people in Dera Ismail Khan District of Pakistan. They reported that the main Dwarf Palm (Mazri) areas are located between Koh-i-Surkh and Marwat hill and yield about 1000 tons of mazri leaves per year. They noted that more than 70% of the date palm fruits fall before ripening. They pointed out that if the production and processing restrictions are properly addressed, it can have a significant socio-economic impact on the local people. Sadeghi and Kuhestani (2014) studied the ethnobotany of Phoenix dactylifera in Saravan region of Iran from various aspects such as distribution, economic, linguistic, food and pharmacological. They interviewed 80 farmers. They noted that the results showed that dates have great potential for the economic advancement of the people in this region. These findings are consistent with our data and provide an important emphasis on the purpose of our study.

Conclusion

Traditional medical knowledge is important not only for its potential contribution to drug development, design and market value, but also for human health care in the past, present and future. Traditional medicine and ethnobotanical inventories and studies have played important roles in drug development in many countries and will continue to contribute to this field in the coming years. In this new millennium, the preservation of traditional medical knowledge and medicinal plant resources in developing countries is essential. Moreover, it is an undeniable fact that no medical system is perfect and complete in its ability to treat all forms of disease and illness. Therefore, it is vital for healthcare providers worldwide to understand, apply and study the medical traditions practiced in all countries. In this context, the ethnobotanical knowledge of Rustam in Mardan District constitutes a critical resource for both the community and the wider scientific community. This study contributes to the preservation of traditional knowledge by documenting the medicinal uses of these plants and encourages further research on the pharmacological potential of these species. Future studies should focus on the phytochemical and pharmacological properties of the most commonly used plants to validate their medicinal uses and explore their potential for incorporation into modern health practices. Thus, with such studies conducted regionally, it can be considered that traditional medicines have a very important role to play in the establishment of natural plant-based economic policies at the regional level.

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