

AN ETHNOBOTANICAL SURVEY IN URBAN AREAS OF DIR LOWER BAR

MALKAND KHYBER PAKHTOON KHWA PAKISTAN

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Abstract

An ethnobotanical survey of medicinal flora was conducted in Dir Lower Bar Malakand. Despite the worth of medicinal plants, minimal data is available in general. The present study deals with collecting, identifying, and documenting medicinal flora in the Patna region. This also pertains to information about the medicinal plants available in an urban environment and their therapeutic effects. About hundreds of medicinal plants were recorded, including herbs, shrubs, trees, climbers, etc. The collected species were put on herbarium sheets and the specimens were deposited in the Department of Botany Govt Ghazi Umara Khan Degree College Samarbagh District Dir Lower. The paper deals with the lists of hundred medicinal plants with their botanical name, common names, families, habits, seasons, ethnobotanical uses, and parts used by each plant. The data provided in the present survey can be useful for further students who want to continue research on this topic, as it provides an idea about the medicinal plants that have newly grown in the vicinity and the ones that have vanished. The plant parts used widely to treat human and livestock health problems included roots, stem, leaves, and others. The most used plants for herbal preparation were leaves that comprised 50%, followed by roots 26%, stems 11%, and bark 9%.

Keywords: Ethnobotanical, medicinal plant, biodiversity, Dir Lower Bar Malakand

Introduction

District Lower Dir, situated in the Khyber Pakhtunkhwa Province of Pakistan, is one of the most important regions, both historically and culturally. It is one of the 26 districts of Khyber Pakhtunkhwa. The district came into existence in 1996 when District Dir was divided into two separate districts i.e., District Lower Dir and District Upper Dir (Abbasi, 2013). Dir was ruled by different rulers till 1880. It was conquered by Khan Umra Khan of Jandool by beating Muhammad Sharif Khan in 1881.

In 1895, the British government fell under the rule of Umra Khan and restored Muhammad Sharif

Khan to the Gaddi. In 1904, Muhammad Aurang Zeb Khan succeeded to the chair after the death of his father, Muhammad Sharif Khan. After the death of Aurang Zeb Khan, his eldest son Muhammad Shah Jehan was acceded to the throne in 1925 (Ahmad *et al.*, 2011). In 1959, the Government of Pakistan dethroned Shah Jehan, and the Dir state was fused into Pakistan as District Dir in 1969. Later in 1996, due to administrative problems District Dir was split into two separate districts i.e., District Lower Dir and District Upper Dir (Ajaib *et al.*, 2021).

The research area (Bar Malakand) is situated to the north of Samarbagh. The bottom of the area lies at the degree of 34°51', 40'' north Latitude, and 71°54', 50'' east Longitude. The top of the area lies 34°47', 22''/degrees north Latitude and 71°56', 03'' east Longitude. The altitude of the area at the bottom is 2746 feet and at the top is 7493 feet (Farooq *et al.*, 2012). The length of the area is about 9 km, and the width is about 8 km. The distance from Timergara city to Bar Malakand is 20 km.

A total of 20 villages are present in the area (Hossain *et al.*, 2021). The study area lies in subtropical dry temperate areas of Pakistan with rich biodiversity. The common species are *Olea ferruginea*, *Monothea buxifolia*, *Acacia modesta*, *Punica granatum*, *Dalbergia sissoo*, *Ficus palmata* and *Quercus baloot* (Hussain *et al.*, 2022). Based on the ecological aspects of the forest communities and quantitative analysis of forest vegetation of the area the upper areas were densely dominated by Chir, Fir, Spruce, Deodar, Kail, Pholai, Babul, Bekanrh, Loor, Zaitoon, Akhroot and Enjeer (Irfan *et al.*, 2018). The weed vegetation was mostly dominated by *Convolvulus arvensis*, *Avena sativa*, *Fumaria indica*, *Tulipa stellata*, and *Stellaria media* respectively (Kamran *et al.*, 2020).

The medicinal plants are said to have traditional and mystic importance. Medicinal plants have provided mankind with a large variety of potent drugs to alleviate or eradicate infections and suffering from diseases despite advancements in synthetic drugs, some of the plant-derived drugs still retained their importance and relevance. The use of plants for treating diseases is as old as the human species. (Kayani *et al.*, 2014) Herbal medicines have become more popular in the treatment of many diseases due to popular belief that green medicine is safe, easily

available and with less side effects and is recommended for the treatment of diabetes throughout the world. Modern medicine has evolved from folk medicine and traditional systems only after chemical and pharmaceutical screening (Khan *et al.*, 2002). Plant diversity remains crucial for human well-being and provides a significant number of remedies required in healthcare. Medicinal plants played a pivotal role in the treatment of various problems in Pakistan (Murad, 2013). Moreover, there are considerable economic benefits in the development of indigenous medicines and the use of medicinal plants for the treatment of various diseases. Indigenous herbal medicine has been popular since time immemorial and recently has also commanded major attention worldwide due to its potential nutraceutical values (Shah *et al.*, 2021).

The efficacy depends on the use of proper plant part and its biological potency which in turn depends upon the presence of the required quantity and nature of secondary metabolite in a raw drug (Shakir *et al.*, 2020). Plant-based medicines are used frequently in underdeveloped communities because they are easily accessible and affordable than modern drugs. Drugs derived from plants have gained importance in recent years all around the world due to their reliable, natural, and safe nature in comparison to advanced drugs which can lead to detrimental side effects (Ullah *et al.*, 2022). The younger generation shows interest in traditional medicines but they lack knowledge about their usage. The topic of Indian medicinal plants and their potential in holistic medicine according to the traditional uses described, has garnered positive attention from researchers in recent decades (Shuaib *et al.*, 2019).

Furthermore, there have been many reports published about tribal and indigenous people using

plants as a part of their folk medicine (Ullah *et al.*, 2022). Now that the traditional knowledge about medicinal plants has garnered importance all over the world, the pharmaceutical industries have also taken the initiative to determine the potency of medicines and toxins utilized by rural communities (Ullah *et al.*, 2023).

The present investigation aimed to provide an ethnobotanical profile of Malakand Valley and an ethnobotanical evaluation of plants in selected area was to determine the uses of plants by local inhabitants. The main purpose of this study was to determine the medicinal uses of plants for different diseases. The present study of plants documented the economic values of the plants in the research area.

Materials and Methods

Description of the study area

The research was conducted in Dir Lower, Khyber Pakhtoon Khwa, Pakistan, specifically in Bar Malakand. The area is located at a latitude of 25.619N, longitude 80.0537E, and an altitude of 53 meters (174 feet). The wet season is characterized by hot weather, while the dry season remains warm. The average summer temperature is 30°C, and the winter average is 17°C. The region receives an average annual precipitation of 1213.3 mm. The soil is highly fertile, consisting of alluvial and black cotton soil, which supports the growth of various crops and grains (Ullah *et al.*, 2021).

Selection of study site

A brief survey of the area was conducted from July 1st to August 20th, 2021. The site, Dir Lower in Khyber Pakhtoon Khwa, Pakistan, specifically Bar Malakand, was chosen due to its rich and abundant flora. The selection was also based on recommendations from teachers (Ullah *et al.*, 2019).

Ethnomedicinal plant survey and plant collection

The specimens of the plant were collected according to the guidelines. The field data of the specimens like local names habits, and habitats was noted during the field study.

Voucher specimen collection

Voucher specimens were collected with preventive measures during the fieldwork. Identification of the specimens was conducted both in the field and later in the herbarium. The specimens were ultimately identified and stored in the Department of Botany at Govt Post Graduate College Samarbagh, Dir Lower, Khyber Pakhtoon Khwa, Pakistan.

Data Collection

The presented data summarize the results of the ethnobotanical survey conducted from July 1st to November 23rd, 2021. Plant species were recorded with their scientific name, family, common name, season, habit, part used, and region found. Data were collected throughout the research period. The detailed data are listed below.

Results and Discussion

From the District Dir Lower Malakand Valley 100 valuable plants are collected between these 52 (31.90%) plants are used for medicinal purposes. Amongst the medicinal plants *Accia niltica*, *Acacia moesta*, *Donea vicosa*, *Metha longioflia*, *Fagonia indica*, *Plantago major*, *Justicia adhatoda*, *Allium sativa*, *Coriandrum sativum*, *Funiculum vulgar*, *Phoenix dactylifera*, *Calotropis procera*, *Psidium guajava*, *Teucrium stocksianum*, *Solanum surrattense*, *Withania coagulants* as well as *Punica granatum* was also highly valued for its medicinal properties and was used to treat various ailments such as digestive issues and inflammation (Ullah *et al.*, 2024).

Table: 1 List of Medicinal flora present in Bar Malakand District Dir Lower

S. No	Voucher Number	Botanical Name	Family	Common Name	Season	Habit	Parts used
1.	7259	<i>Monstera deliciosa</i>	Araceae	Swiss Cheese	Spring	Herb	Roots
2.	7173	<i>Bougainvillea</i>	Nyctaginaceae	Bougainvillea	Onset of Summer	Shrub	Leaves
3.	7203	<i>Carica papaya</i>	Caricaceae	Papaya	Spring, Monsoon, Autumn	Tree	Leaves, Pulp
4.	7084	<i>Azadirachta indica</i>	Meliaceae	Neem	Winter, Spring	Tree	Leaves
5.	7202	<i>Vinca rosea</i>	Apocynaceae	Saada Bahar	Annual	Herb	Flower, leaves
6.	7199	<i>Malvaviscus arboreus</i>	Malvaceae	Wax Mallow	Early Spring	Shrub	Flower, Leaves
7.	7088	<i>Begonia glabra</i>	Begoniaceae	Hortus Botanicus Amsterdam	Summer	Herb	Rhizome
8.	7142	<i>Abelmoschus esculentus</i>	Malvaceae	Okra	Summer, Monsoon	Shrub	Mucilage, Seed, Pods
9.	7145	<i>Momordica charantia</i>	Cucurbitaceae	Bitter Gourd	Summer, Monsoon	Climber	Stem, Root, leaves
10.	7220	<i>Jasminum sambach</i>	Oleaceae	Arabian Jasmine	Summer, Mild Winter	Shrub	Flower
11.	7050	<i>Spagheticola trilobata</i>	Asteraceae	Singapore Daisy	Late spring	Herb	Leaves
12.	7121	<i>Tinospora cordifolia</i>	Menispermaceae	Heart-leaved moonseed	Winter	Climber	Root, Stem, leaves
13.	7035	<i>Hibiscus rosa-sinensis</i>	Malvaceae	Shoe black plant	Summer	Shrub	Root, leaf, flower
14.	7165	<i>Cetenella asiatica</i>	Apiaceae	Gotu Kola	Monsoon	Herb	Entire plant
15.	7175	<i>Punica granatum</i>	Punicaceae	Pomegranate	Winter	Shrub	Root, bark, fruit
16.	7221	<i>Clitoria ternatea</i>	Fabaceae	Butterfly Pea	Spring, Summer	Herb	Roots, leaves
17.	7098	<i>Moringa oleifera</i>	Moringaceae	Drumstick tree	Summer	Tree	Entire plant
18.	7123	<i>Plyllanthus emblica</i>	Phyllanthaceae	Amla	Winter	Shrub	Fruit Pulp
19.	7168	<i>Rauvolfia serpentina</i>	Apocynaceae	Indian snakeroot	Summer, Winter	Herb	Root
20.	7222	<i>Zingiber officinale</i>	Zingiberaceae	Ginger	Early Summer	Herb	Rhizome
21.	7195	<i>Molineria capitulata</i>	Aricaceae	Palm Grass	Late Summer	Herb	Rhizome
22.	7052/7113	<i>Aloe barbadensis</i> Mill.	Asphodelaceae	Aloe Vera	Early Spring	Herb	Leaves
23.	7224	<i>Kalanchoe pinnata</i>	Crassulaceae	Cathedral Bells	Annual	Shrub	Leaves
24.	7176	<i>Withania somnifera</i>	Solanaceae	Ashwagandha	Spring	Shrub	Root, orange-red fruit
25.	7089	<i>Coleus barbatus</i>	Lamiaceae	Panikoorka	Annual	Herb	Tuberous root
26.	7225	<i>Psidium guajava</i>	Myrtaceae	Guava	Summer	Tree	Leaves, fruit
27.	7072	<i>Mentha piperita</i>	Lamiaceae	Mint	Summer, Spring	Herb	Leaves
28.	7226	<i>Citrus limon</i>	Lamiaceae	Lemon	Monsoon	Shrub	Fruit
29.	7227	<i>Saraca asoka</i>	Fabaceae	Ashoka	Spring	Tree	Seed, bark, flower
30.	7228	<i>Murraya koenigii</i>	Rutaceae	Curry Tree	Evergreen	Tree	Leaves
31.	7194	<i>Cucurma longa</i>	Zingiberaceae	Turmeric	Early Winter	Herb	Underground rhizome
32.	7122	<i>Ocimum tenuiflorum</i>	Lamiaceae	Krishna Tulsi	Late Spring	Herb	Leaves
33.	7229	<i>Asparagus recemosus</i>	Asparagaceae	Shatavri	Autumn	Climber	Leaves, roots

34.	7093	<i>Cheilocostus speciosus</i>	Costaceae	Spiral-ginger	Winter	Shrub	Leaves, rhizome
35.	7230	<i>Monoon longifolium</i>	Annonaceae	False Ashoka	Late-spring	Tree	Bark
36.	7174	<i>Cymbopogon citratus</i>	Poaceae	Lemon grass	Spring	Herb	Entire plant
37.	7120	<i>Adenium obesum</i>	Apocynaceae	Desert rose	Summer	Succulent	Stem, Bark powder
38.	7231	<i>Alocasia macrorrhizas</i>	Araceae	Giant taro	Spring, summer,	Herb	Stem, root leaves
39.	7067	<i>Zephyranthes minuta</i>	Amaryllidaceae	<i>Zephyranthes grandiflora</i>	Summer to autumn	herb	Bulb leaves
40.	7232	<i>Alpinia zerumbet</i>	Zingiberaceae	Shell ginger	Monsoon, summer	Shrub	Leaves
41.	7166	<i>Amaranthus spinosus</i>	Amaranthaceae	Spiny amaranth	Summer, autumn	Herb	Roots. leaves
42.	7179	<i>Andrographis paniculata</i>	Acanthaceae	Green chiretta	Onset of monsoon	Shrub	Entire plant, roots
43.	7177	<i>Anethum graveolens</i>	Apiaceae	Dill	Late spring to summer	Herb	Seed
44.	7069	<i>Acorus calamus</i>	Acoraceae	Vacha	Autumn	Herb	Root (rhizome)
45.	7073	<i>Allium sativum</i>	Amaryllidaceae	Garlic	Fall, spring	Herb	Rhizome
46.	7060	<i>Asparagus officinalis</i>	Asparagaceae	Asparagus	Spring	Perennial	Root
47.	7077	<i>Acalypha wilkesiana</i>	Euphorbiaceae	Jacob's coat	Evergreen	Shrub	Leaves
48.	7118	<i>Agapanthus praecox</i>	Amaryllidaceae	Blue Lily	Summer	Herb	Root
49.	7233	<i>Agave americana</i>	Asparagaceae	Century plant	Summer	Herb	Leaves
50.	7140	<i>Arpidistra elatior</i>	Asparagaceae	Cast Iron Plant	Summer	Shrub	Rhizome
51.	7037	<i>Albizia julibrissin</i>	Fabaceae	Persian Silk Tree	Summer	Shrub	Bark
52.	7087	<i>Swertia chirayita</i>	Gentianaceae	Chiraita	Autumn	Herb	Part above ground, root
53.	7059	<i>Ricinus communis L.</i>	Euphorbiaceae	Castor Herb	Fall, summer	Herb	Leaves, root, bark
54.	7114	<i>Magnolia grandiflora</i>	Magnoliaceae	Southern Magnolia	Winter, Spring	Shrub	Seed
55.	7117	<i>Costus igneus</i>	Costaceae	Insuline	Spring	Herb	Leaves
56.	7234	<i>Alocasia cucullata</i>	Araceae	Buddha's hand/ Chinese Taro	Spring - summer	Shrub	Leaves, stem
57.	7076	<i>Anthurium hookeri</i>	Araceae	Bird's nest anthurium	Summer, Winter	Tree	Leaves, stem
58.	7196	<i>Annona reticulata</i>	Annonaceae	Custard Apple	Late winter	Tree	Fruit
59.	7097	<i>Acer palmatum</i>	Sapindaceae	Japanese Maple	Autumn	Shrub	Leaves
60.	7038	<i>Phyllanthus urinaria</i>	Phyllanthaceae	Chamber bitter	Early summer	Herb	Stem, leaves
61.	7235	<i>Musa acuminata</i>	Musaceae	Banana	Summer, monsoon	Evergreen perennial	Fruit, leaves, root
62.	7149	<i>Basella alba</i>	Basellaceae	Indian spinach	Summer, Spring	Perennial vine	Leaves, root
63.	7236	<i>Bacopa monnieri</i>	Plantaginaceae	Brahmi	Mid-spring	Creeping Herb	Leaves, seed
64.	7146	<i>Trifolium repens</i>	Fabaceae	White clover	Spring -summer	Herb	Leaves and flower
65.	7092	<i>Bryophyllum pinnatum</i>	Crassulaceae	Miracle leaf	Summer	Succulent	Leaves
66.	7161	<i>Bassia scoparia</i>	Amaranthaceae	Summer Cypress	Summer	Herb	Fruit
67.	7127	<i>Clivia miniata</i>	Euphorbiaceae	Bush lily	Spring	Herb	Root, leaves
68.	7053	<i>Celosia argentea</i>	Amaranthaceae	Silver cock's comb	Mid-spring to summer	Herb	Leaves

69.	7130/7136	<i>Desmostachya bipinnata</i>	Poaceae	Salt reed grass	Summer, monsoon, winter	Herb	Aerial part
70.	7171	<i>Datisca cannabina</i>	Datisceae	Akalbir	Autumn	Herb	Entire plant
71.	7055	<i>Dieffenbachia seguine</i>	Araceae	Tuft root	Spring	Shrub	Sap/ seed
72.	7062	<i>Dryopteris filix-mas</i>	Dryopteridaceae	Male fern	Summer, spring, fall	Herb	Leaf
73.	7238	<i>Cosmos sulphureus</i>	Asteraceae	Sulfur cosmos	Early autumn	Herb	Leaves, root
74.	7085	<i>Datura stramonium</i>	Solanaceae	Datura	Early Spring	Herb	Seed
75.	7162	<i>Epipremnum aureum</i>	Araceae	Money plant	Summer	Climber	Leaves, aerial root
76.	7186	<i>Gaillardia pulchella</i>	Asteraceae	Blanket flower	Early summer	Herb	Root
77.	7180	<i>Homalomena rubescens</i>	Araceae	Maggy	All season	Shrub	Rhizome
78.	7158	<i>Impatiens balsamina</i>	Balsaminaceae	Balsam	Spring to summer	Herb	Leaves
79.	7157	<i>Ipomoea batatas</i>	Convolvulaceae	Sweet potato	Autumn	Herb	Leaves
80.	7182	<i>Ixora coccinea</i>	Rubiaceae	Pendkuli	Summer, monsoon	Shrub	Flower, leaves, root, stem
81.	7054	<i>Jasminum officinale</i>	Oleaceae	Jasmine	Spring, summer, early fall	Climber	Flower
82.	7044	<i>Justicia gendarussa</i>	Acanthaceae	Willow-leaved justicia	Monsoon	Shrub	Leaf
83.	7047	<i>Manihot esculenta</i>	Euphorbiaceae	Ornamental cassava	Autumn	Shrub	Leaves, seed
84.	7048	<i>Murraya paniculata</i>	Rutaceae	Orange jasmine	Spring- summer	Shrub	Bark of stem
85.	7131	<i>Oxalis triangularis</i>	Oxalidaceae	False Shamrock	Summer, fall, winter	Herb	Leaves
86.	7160	<i>Persicaria maculosa</i>	Polygonaceae	Redshank	Spring, summer	Herb	Leaves, young shoot
87.	7057	<i>Piper longum</i>	Piperaceae	Pipli	Monsoon	Shrub	Fruit
88.	7147	<i>Podocarpus macrophyllus</i>	Podocarpaceae	Buddhist Pine	All season	Tree	Bark
89.	7239	<i>Platicladus orientalis</i>	Cupressaceae	Morpankhi	Monsoon, spring	Shrub	Leaves
90.	7240	<i>Portulaca oleraceae</i>	Portulacaceae	Common Purslane	Late spring-late summer	Herb	Aerial part
91.	7116	<i>Phyllanthus niruri</i>	Phyllanthaceae	Bhuin Aovla	Summer to early monsoon	Tree	Leaves
92.	7115	<i>Piper betle</i>	Piperaceae	Betel	Spring, early summer	Tree	Leaves
93.	7079	<i>Plumaria pudica</i>	Apocynaceae	Bridal bouquet	Summer	Shrub	Leaf, stem
94.	7105	<i>Syringa vulgaris</i>	Oleaceae	Common lilac	Mid to late spring	Shrub	Flower, leaves, bark, root, stem, fruit
95.	7108	<i>Talinum paniculatum</i>	Talinaceae	Fame flower	Summer	Succulent	Leaves
96.	7107	<i>Polyscias fruticosa</i>	Araliaceae	Ming aralia	Spring-fall	Shrub	Leaves
97.	7144	<i>Ocimum basilicum</i>	Lamiaceae	Basil	Mid-summer	Herb	Leaves, flowering tops
98.	7216	<i>Aglaonema commutatum</i>	Araceae	Chinese Evergreen	Spring, summer	Herb	Roots
99.	7124	<i>Capsicum frutescens</i>	Solanaceae	Cayenne pepper	Summer-Winter	Herb	Fruit
100.	7133	<i>Chrysanthemum indicum</i>	Asteraceae	Chrysanth-emum	Winter, monsoon	Shrub	Flower

People living in rural areas, especially the elders retain knowledge about the medicinal importance of the plants which facilitates transmission of this type of knowledge from generation to generation among them. People living in urban areas have little to no knowledge about traditional medicine, therefore there is a dire need to pass the information from various ethnic communities to them before it is lost (Ullah and Shakir, 2023).

The people of Arrang Valley are still dependent on plants in their daily lives. Because people are poor and cannot afford the modern allopathic medicine. In the current research work, a total of plants cannot be separated from their lives and this reciprocal interdependence is accountable for the preservation of plant variety. Plants are either used singly or in a mixture. Medicinal plants such as *Mentha longifolia*, *Acacia modesta*, *Podophyllum headroom*, *ajuga bracteosa*, *Prunus domestica*, etc. are some of the medicinal plants that are in active use in Arrang. Some of the most valuable therapeutic vegetation is on the verge of extermination due to over-exploitation (Sajid *et al.*, 2024).

Among these are *Periploca aphylla*, *Calotropis procera*, *Funiculum vulgare*, *Ammi visnaga*, *Ziziphus mauritiana*, *withania omnifera*, etc. So far know-how about the use and identification of useful ethnomedicinal use of plants is concerned; elderly people beyond 60 years of age have almost 40 percent of the required knowledge (Ullah *et al.*, 2019). Plants are utilized for treating various ailments, accounting for 6% of the overall diseases prevalent among them. Pathetically the young generation below 50 years of age has very low level of knowledge about medicinal plants ranging from 10 to 12 %. Their use of medicinal plants was very less just falling in the ratio of 0.78 %. Children of Malakand are almost

ignorant about medicinal plants but during illness they are at first treated with these medicinal plants. Due to steel and cement the trends of using timber in the constructions has been reduced considerable but still the use is visible.

Furniture has retained the wood as in the old days and people prefer it in comparison with steel. Complete details of the ethnobotanical valuable plants are as below. A fraction of the 100 plants, accounting for 33.3% of the total, are used for their stems. Leaves are used in 3.08% of the plants, while fruits are used for 1.85% and roots for 1.85% as well. Additionally, a combination of leaves and fruits is utilized in 4.83% of the plants, and flower shoots in 2.46%. Other combinations include shoot roots (2.46%), seed and leaves (3.08%), wood and leaves (1.23%), and leaves and shoots (1.23%). Wood and seeds are used in 3.70% of the plants, while leaves and roots account for 1.23%. Figure 2 illustrates the habitat-wise distribution of plant species in the research area, highlighting the diverse plant types present. The data reveal that herbs constitute the largest group, accounting for 44% of the total plant population. This dominance of herbs indicates the area's rich herbaceous flora, which likely includes a variety of medicinal and culinary plants.

Shrubs make up the second-largest group at 31%. Shrubs are typically woody plants smaller than trees and play a crucial role in the ecosystem by providing shelter and food for various wildlife species (Khan *et al.*, 2018). Their substantial presence suggests a well-developed understory vegetation layer. Climbers, which comprise 5% of the plant population, are plants that rely on other structures for support, often scrambling over other plants to reach sunlight.

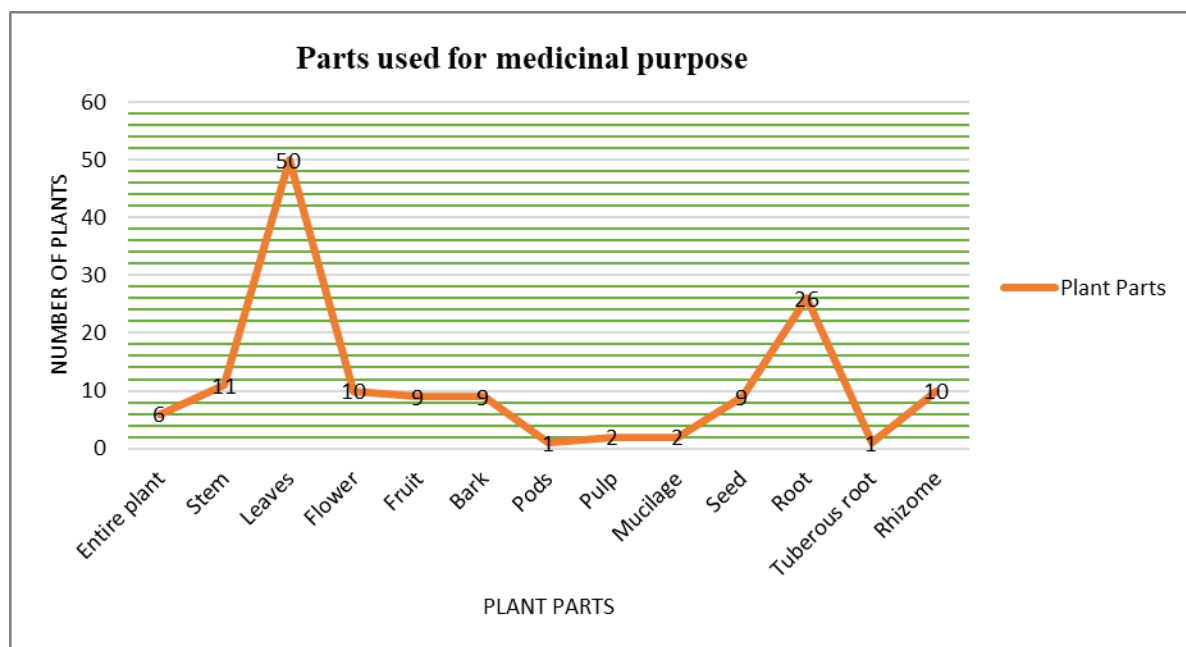


Fig 1: Different Parts of plants used for medical purposes

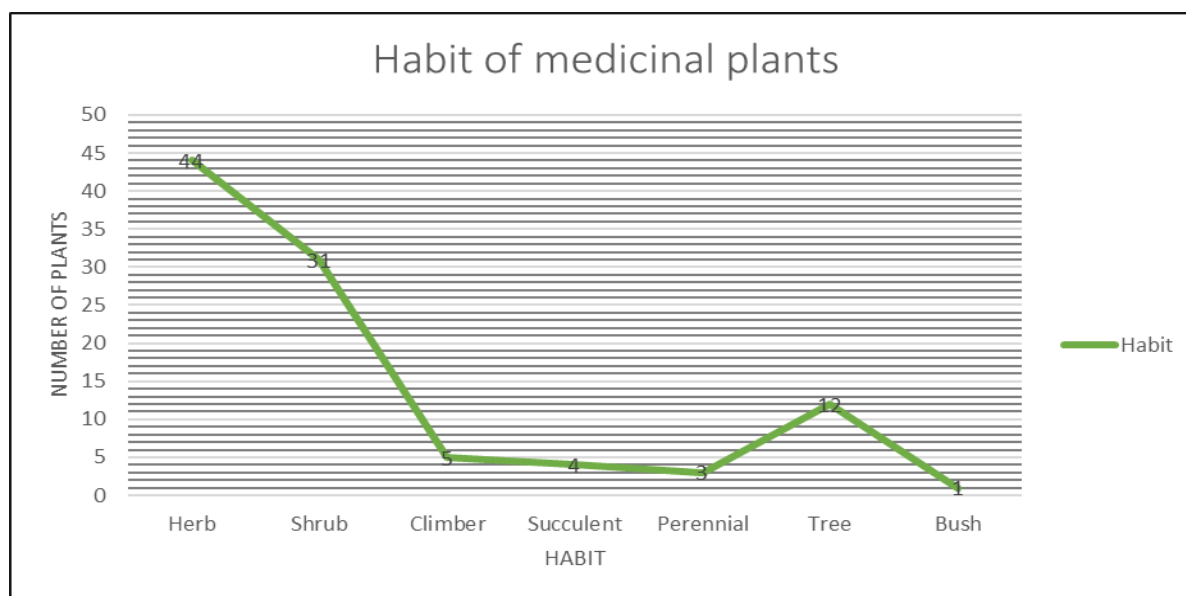


Fig 2: Plants and their Habitats

This category includes vines and creepers, which are vital for creating complex habitats and offering food and shelter for many organisms. Succulents represent 4% of the vegetation (Ahmad *et al.*, 2021). These plants are adapted to arid conditions and are characterized by their ability to store water in their leaves, stems, or roots. The presence of

succulents indicates that parts of the research area may experience dry conditions where such water-retentive plants can thrive. Perennials account for 3% of the plant population.

These plants live for more than two years and can withstand various climatic conditions. Their presence highlights the area's capability to support

long-lived plant species that contribute to the stability of the ecosystem.

Trees constitute 12% of the vegetation, forming the structural backbone of the ecosystem (Habib, 2015). Trees provide essential ecosystem services such as carbon sequestration, habitat for wildlife, and stabilization of soil. Their significant proportion underscores the area's potential for supporting diverse forest ecosystems. Lastly, bushes make up 1% of the plant population. These smaller, dense woody plants often serve as transitional vegetation between herbaceous plants and taller shrubs or trees. Although they represent a small fraction of the overall plant population, bushes play a role in creating habitat diversity and supporting various animal species.

The present research does not provide ample information, but it formulates a general idea about the ethnobotanical importance of the area and the pharmacological importance of the medicinal plants. Throughout the survey carried out from 1st August to 30th November, hundreds of medicinal plants belonging to different genera and species were detected in Bar Malakand Dir Lower.

Medicinal plants reported were used in treatment of various diseases like stomach ailments, skin disease, fever, etc. Different parts of plants, particularly the leaves, inflorescence, and fruits were considered for making drugs for the treatment of various ailments. The plants under the present investigation were collected from different areas which included herbs, shrubs, trees, climbers, perennials, succulents, and bushes (Irfan *et al.*, 2017). The present investigation deals with hundreds of medicinal floras. 53 families were recorded of which 36 belong to monocotyledons, 54 to dicotyledons, 4 to gymnosperms, 5 to angiosperms, and 1 to

pteridophyte. Out of a hundred medicinal plants that were studied, the result of growth from analysis of medicinal plants showed that herbs like *Vinca rosea*, *Rauwolfia serpentina*, *Aloe barbadensis M.*, *Coleus barbatus*, etc made up the highest proportion with 24 species, followed by shrubs like *Bougainvillea*, *Jasminum sambac*, *Hibiscus rosa-sinensis*, *Punica granatum* with 18 species, trees like *Carica papaya*, *Azadirachta indica*, *Moringa olifera*, *Psidium guajava* made up 8 species and rest consisted of climbers, perennial and succulent (Ullah *et al.*, 2019).

The plant parts used widely to treat human and livestock health problems included roots, stem, leaves, and others. The most used plants for herbal preparation were leaves that comprising 50%, followed by roots 26%, stems 11%, and bark 9%. Worked on the medical plants and their conventional utilization in Village Thana, District Malakand, KpK, Pakistan, and reported various plant species used as food. A total of 18 (11.65%) plants were used as fodder for various animals (Khan *et al.* 2003). A total of 63 (3.68%) plants species were employed for ornamental intention. Among these plants, *Narcissism Poeticus*, *Plumeria rumba*, *Tagetes minut* *Ipomoea hederia*, *Thuja orientalis*, *Salvia moorcroftana*, *Callistmon culminates* (Ullah *et al.* 2023), *Mirabilis Jalapa*, *Pteris ceritica*, are mostly planted the locals (Ullah *et al.* 2019).

Work on the ethnobotany of Ranyal hills, District Shangala, Pakistan and recorded 7 ornamental species. *Populus alba* and *Platanus orientalis* are the most important plant species that were utilized through the local peoples for ornamental. A total of 9 (5.52%) plants are used by the local people for furniture. Among these plant *Quercus incana*, *Ficus carica*, *Olea ferrognea*. *Platanus orientalis* and *Populus alba* are used by the local people. Work on the ethnobotany

of Thana Village, Distract Malakand and Khyber Pakhtunkhwa, Pakistan for furniture purposes. Consequently, the area needs the suitable organization

of these precious plants as well as particularly the remedial plant requires conservation.

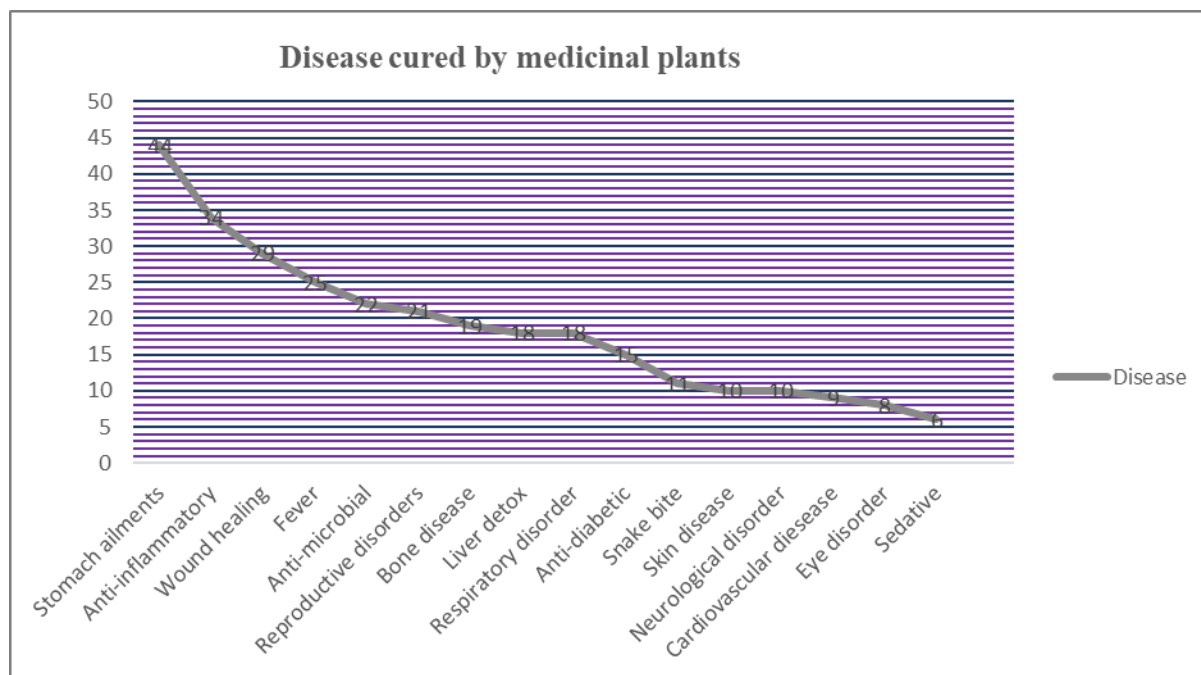


Fig 3: The Disease curing by the plants and their parts

Table.2 Following are the threatened species of medicinal plants recorded in Dir Lower Malakand the survey

Scientific name	Common name	Family
1. <i>Bacopa monnieri</i>	Brahmi	Plantaginaceae
2. <i>Swertia chirayita</i>	Chiraita	Gentianaceae
3. <i>Acorus calamus</i>	Vacha	Aceraceae
4. <i>Rauvolfia serpentina</i>	Sarpagandha	Apocynaceae
5. <i>Asparagus racemosus</i>	Shatavari	Asparagaceae

Conclusion

Dir Lower has a rich and variable flora which in part explains the frequent use of plants for therapeutic, cosmetic, and gastronomic purposes. The medicinal plants have various preparation methods which vary based on the types of disease and the actual site of the ailments. Preparation methods like concoction, decoction powder, crushing, and homogenization in

water can be implied. The overall study shows the use of medicinal plants by natives is alive and well-functioning in the study area.

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Conflict of interest

The authors declare no Conflict of interest

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