Volume 3, Issue 7, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

SPATIAL AND TEMPORAL PATTERN OF MEDICINAL FLORA USING GIS: A CASE STUDY OF TEHSIL ISA KHEL (MIANWALI)

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DOI: https://doi.org/10.5281/zenodo.17085443

Keywords
Geographic Information System, Spatial distribution, Medicinal Flora, Isa Khel, Ethnobotanical knowledge

Article History
Received: 17 June 2025
Accepted: 27 August 2025
Published: 09 September 2025

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Abstract

Study was confined to document the plant species in north and east parts of Tehsil Isakhel district Mianwali, Punjab, Pakistan, used by the local people of the area. In total 76 plant species were collected during summer and winter seasons belonging to 39 families and 70 genera. Mapping of local distribution of plants was made by using GIS (Geographic Information System). By using GIS seasonal plant species were arranged in map according to nature and distribution in local areas of Isa khel. To get rid of difficulty, GIS was used for the convenience to know the local distribution of plants in study area. People of the study area had close relationship with surrounding plant resources and depend on plants for their food, health, shelter, fodder, fuel wood and other cultural purposes. Plant species were collected from eleven parts of Tehsil Isa khel in north and east directions. North areas were Kamar Mushani, Udhey Wala, Chapri, Sodhri, Ghaziwal and east areas were Burzi, Mandakhel, Khuduzai, Jalalpur, Kot Chandna and Kalabagh. Each species was described with english name, local name, collection area, botanical name, flowering period, specimen number, ethnomedicinal uses and mode of administration. Mostly plant species were used to treat joint pains, dysentery, diarrhea, sexual desire, stomach problems, piles, constipation, toothache, vomiting, jaundice, asthma and inflammations. Study revealed that the research area had many plants that were used to treat various diseases. Main purpose of the study was to save the ethnobotanical knowledge in the form of documentation which is the method to conserve the knowledge its original form and secondly the utilization of medicinal plants by the local people of Tehsil Isa Khel.

INTRODUCTION

Isakhel is a tehsil of Mianwali District in Punjab province of Pakistan. It is a subdivision of the district Mianwali and is located at 32°40'29N 71°16'52E. Isakhel is present in the west of Mianwali

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ISSN: (e) 3007-1607 (p) 3007-1593

District (Figure 1). It has great history and importance, named after Isa Khan, a famous Niazi chief. Until November 1901, Isakhel was the part and tehsil headquarter of Bannu District – however now tehsil isakhel excluded from Bannu District and became a part of Mianwali District. Bannu District is included in Khyber Pakhtunkhwa without Isakhel Tehsil.

The tehsil Isakhel contains three Municipal Committees Isakhel, Kamar Mushani and Kala Bagh. It has thirteen Union Councils included Chapri, Khaglan Wala, Kaloaan Wala, Kallur Shareef, Kamar Mushani Pakka, Kot Chandna, Manda Khel, Sultan Khel, Tabisar, Tanikhel, Tola Bhangi Khel, Trag and Vanjari. During 1901 census, Isakhel contained 7,630 population and Kalabagh population was 5,824.The tehsil Isakhel has maximum weather reports. June is hottest month with average $42C^0$-$52C^0$ temperature, wherease in Dec and Jan temperature is lower than $3\text{-}4C^0$. Average rainfall is 280mm.

People of study area have tube well systems for irrigation and drinking. North part of study area contain hills, East part plains and hills, south part contains plains and Indus River. Coal mountains are present in Makerwal and salt hills in Kalabagh.Three types of soil sandy, clay and loamy are present in this area. Soil types are suitable for the cultivation of crops and vegetables. Total area of tehsil isakhel is 678 square miles or 1,760 square km.

Mostly people of the isakhel are farmers and their main job is farming. Most population lives in rural areas and the population live in urban areas also depend on agriculture. They cultivate many crops like maize, mustard, cotton, sugarcane, sunflower, cluster beans and wheat etc. Vegetables like cabbage, gourds, melons, radish, turnip, coriander, spinach etc are cultivated by the inhabitants. Trees like *Eucalyptus camaldulensis, Dalbergia sissoo, Morus sp, Melia azedarach, Acacia nilotica, Ziziphus nummularia* are specially cultivated for timber, fuel and as well as medicinal purposes.

The flora of the area is very unique due to different habitat, soil types and geographical division. A large forest called Kachha forest near Indus river is present in south part of Isakhel, in normal range forestation present in Kalabagh range. Mostly *Acacia nilotica* (Kiker) is found along roads. *Dalbergia sissoo* (Tali) is most common in the richest parts of the area. *Melia azedarach* (Dherak) grows wild as well as planted on well's fields and houses. Trees like *Morus alba*, (Chitta Toot), *Morus nigra* (Kala Toot), *Eucalyptus camaldulensis* (Safaida) are found abundantly in the area.

The common hill shrubs are *Rhazya stricta* (Venra), *Withania coagulens* (Khamjeera) etc are present in hills of Chapri, Nasri and Tabisar. The grasses of the area have great values due to their little availability for the cattles. Similarly there is a great variety of herbs in various parts of the area. The common herbs of the area are *Amaranthus vridus*,(Chulai), *Asphodelus tenuifolius* (Piazi), *Carthamus oxyacantha* (Poli), *Chenopodium album* (Bathua), *Peganum haramla* (Harmal), *Trianthema portulacastrum* (Itsit) etc.

Both human and animal diseases are controlled by the use of medicinal plants, some plants are capable to control only one disease but mostly have multiple uses (Shinwari., 2011). Qureshi & Ghufran (2005) reported that herbs are very important to make herbal medicines by local people of remote areas to treat different types of ailments.

The study can show the relationship among people and plants of the area. The people of the area depend on plants to treat various diseases and also use them for food, shelter, fuel wood and other cultural purposes. Main purpose of the study was to conserve the knowledge of local people in the form of documentation.

Volume 3, Issue 7, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

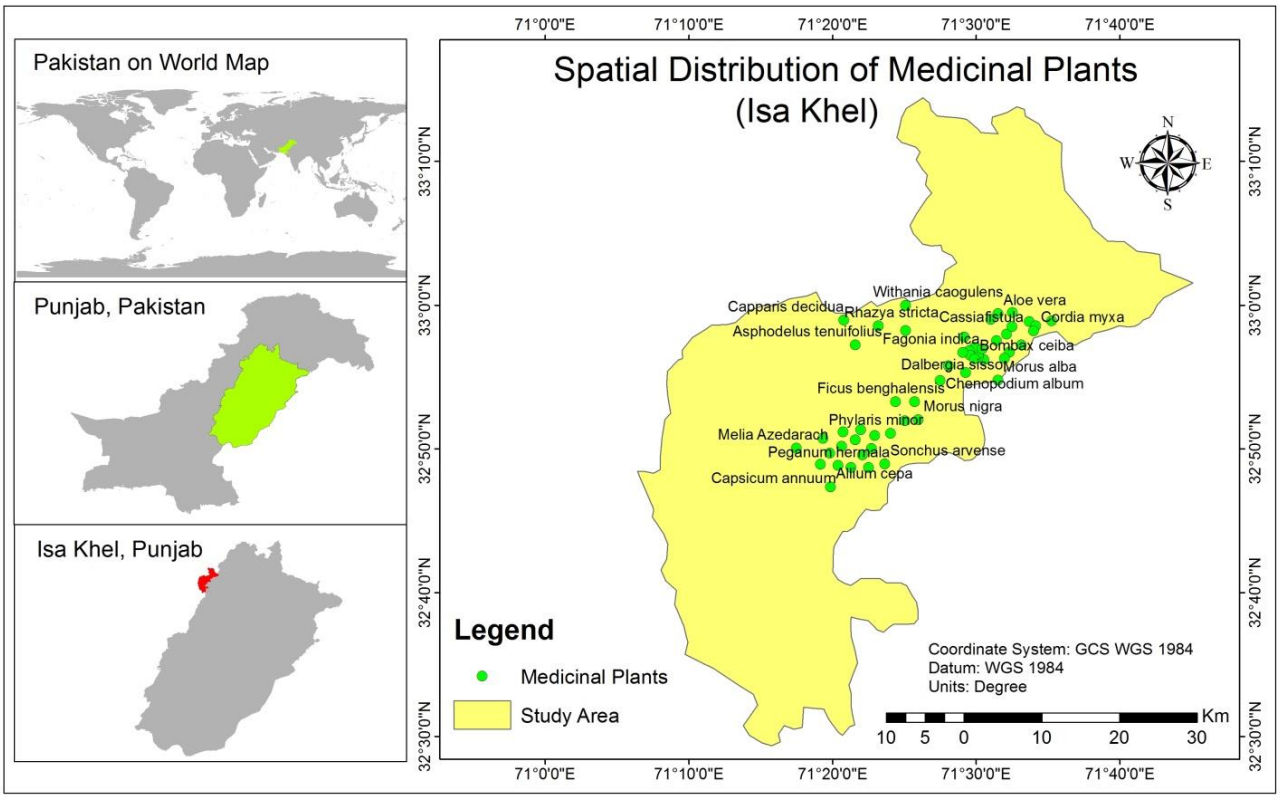

Figure 1. Spatial distribution of medicinal plants by GIS in Tehsil Isa Khel (Mianwali)

Materials and Methods

Documentation of Ethnobotanical Knowledge

For documentation many inter disciplinary approaches were used to collect information about the medicinal plants used by local people of the study area. The method used to collect ethnobotanical information mainly based on questionnaires (Ahmad et al., 2011). During documentation men, women, herbalists and knowledgeable persons were interviewed which were the main users of medicinal plants. The questionnaires contained informations including general observations, experience and cross questions.

Plant Collection

Field trips of the study area were arranged according to the life form, flowering period and the season of utilization of the plant materials by local people. During field trips collection of plants was done. During plant collection two directions North and East were focused especially. Various plant parts like twigs, roots and leaves of medicinal species were collected from a study area. The specimens were collected and collected plant samples were given specimen numbers.

Herbarium Preparation

Firstly samples were pressed and then dried keeping in between blotting paper sheets and old newspapers. Newspapers, Blotting papers, and a plant presser were used for the preservation of plant samples and newspapers were changed until the samples became completely dry. The completely dried specimens were poisoned and then placed on Herbarium sheets. The herbarium specimens were then alloted individual numbers and were deposited in the Department of Govt College University, Faisalabad for future references.

Plant Identification

The plant species were identified by taxonomist with the help of characters and available literature in the

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ISSN: (e) 3007-1607 (p) 3007-1593

light of International Code of Botanical Nomenclature. Identification of plant species was confirmed by matching with authentic samples present in the herbaria of Govt, College University Faisalabad. After correct identification, the plants were given specimen number and deposited in the Herbarium for future references.

Floral and Ethnobotanical Inventory

The Ethnobotanical inventory consists of botanical name, family name, English names, local names, flowering period, part used, ethnobotanical uses and mode of administration.

Mapping by using Geographic Information System (GIS)

GIS was used to investigate the biological structure of plants and their spatial distribution in nature which has great importance. Mapping system provided support to these applications for solving their problems and achieving their objectives. The natural plant taxa spreaded in eleven villages of Tehsil Isakhel were detected by GIS method. Plants relationship with habitat was supported by the help of spatial analysis. The distribution, systematic features and life form of plants were described in maps and provided accuracy.

Results and Discussion

A total of **76 medicinal plant species** belonging to **39 families** were documented regarding their ethnomedicinal value against different diseases in study area (Table.1).Most of the plant species belong to families' poaceae, Fabaceae, Moraceae, Solanaceae, Asteraceae, Chenopodiaceae, Amaranthaceae, Malvaceae, Zygophyllaceae, Liliaceae, Boraginaceae, Brassicaceae, Capparaceae and along with many other families. These plants were traditionally used for the treatment of a wide range of human and animal ailments (Asfaw &Abebe2021). Whole plants, leaves, roots, seeds, fruits, flowers, bark, and latex were reported as the main sources of remedies (Sharma et al., 2022).The plants were used to treat diverse conditions including **liver disorders, jaundice, digestive problems, respiratory diseases (cough, asthma, bronchitis), constipation, diarrhoea, diabetes, kidney stones, skin diseases, inflammations, piles, sexual weakness, and fever** (Table. 1). Some were also used for **animal health** (e.g., milk production, worms)(Alamgeer,et al., 2018).Remedies were mostly prepared as **decoctions, powders, juices, extracts, or pastes**, and administered orally, topically, or through smoke/fumes (Sethi 2007).**Notable species were** *Trianthema portulacastrum* (liver tonic, asthma, fever), *Amaranthus viridis* (joint pain, snake/scorpion bites, constipation), *Calotropis procera* (wounds, jaundice, baldness, piles), *Withania somnifera* (backache, kidney stones, diabetes), *Aloe vera* (acne, hair problems) and *Ziziphus nummularia* (diabetes, sexual desire)(Hasanpuri et al., 2024).

Overall, the results highlight the **rich ethnomedicinal knowledge** of the studied region, showing reliance on locally available flora for primary healthcare and veterinary uses.The study is confined to evaluate the ethnobotanical knowledge and plants resources by using documentation method. Documentation is very important method to conserve the knowledge of native people in its original form (Martin,2010).

Due to high costs of modern medicines people use herbal medicines to treat various diseases.Herbal medicines are made by medicinal plants that are less costly and have least side effects . Due to this reason, people of this area mostly depend on medicinal plants for the treatment of different human diseases as well as animals(Hussain et al., 2024). The study area consists of plains and mountains. Upper North part contains hills, East part contains hills and plains, South part consists of plains and Indus River, west part contains plains with sandy soil and center has all plains. During different field trips, it revealed that plants are very important for the local people of the area. It is noted that there is a great relationship among plants and local people of that area. Most of the dominant species of the hilly area are *Rhazya stricta, Salvedora persica, Withania coagulens* and *Capparis decidua*. Local people of Chapri, Nasri and Tabisar use these plants for many diseases.Dominant species in plains are *Dallbergia sissoo, Acacia nilotica, Morus spp., Melia azedarach, Aerva javanica*. Mostly plant species are herbs and shrubs; some are trees that have medicinal values for the local people of study area. In total 76 plant species are documented

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

in present work belonging to 39 families and 70 genera which are used to treat 30 different diseases.

Trianthema partulacastum is widely used by local people of the area for Jaundice. Roots are cut into pieces to make necklace for the treatment of jaundice (Chandra 2016). *Achyranthus aspera* is famous for its use for cough and asthma. Its decoction is used for this purpose (Akbar 2020). *Trachyspermum ammi* is used to cure gas problems and abdominal pain (Goyal et al., 2022). *Carthamus oxycantha* is found and grow with wheat crop. Local people of area use it for the cure of jaundice (Ahmad 2007). *Rhyzia stricta* was seen in the upper North areas of Isakhel like chapri, nasri and tabisar (Gilani 2007). Branches were used as Miswak to cure tooth pain, Smoke of leaves was used to treat jaundice and leaves extraction was used to cure digestive problems (Akhtar et al., 2011). Decoction of fruit of *Cassia fistula* was given to childrens to cure constipation (Mozaffarpur et al., 2012). *Calotropis procera* was used to make medicine for cough and asthma. Latex was used to cure body inflammations (Meena et al., 2011). *Cuscuta reflexa* is Epiphytic plant on *Ziziphus nummularia*. Whole plant is very important used to treat digestive and joint problems in goat and other animals (Chaturvedi& Singh 2013).*Peganum hermala* is common herb found in plains and in graveyard areas. Smoke of leaves is used to treat skin infections and powder of seeds is used to relieve abdominal pain (Nair et al., 2021). *Chenopodium album* is a herb grow in summer season used to make medicines that are applied for jaundice, constipation and liver diseases (Kaur et al., 2024).*Capparis decidua* is a dominant species of hill and as well as plain area. Plant is used for blood purification and constipation (Hussain et al., 2024).

Recent study revealed the documentation of medicinal plants in North and East part of Tehsil Isakhel. Questionaire method was used during documentation of medicinal plants. Interviews were arranged in local communities to investigate knowledgeable persons who were the main users of plants (Chekole2017). During field trips seasonal plants were collected, identified by taxonomist and then placed on herbarium sheets. Plant species were collected from eleven parts of Tehsil Isakhel in North and East directions.Each species described with Family name, English name, local name, collection area, botanical name, flowering period, part used, specimen number, ethnomedicinal uses and mode of administration (Singh 2008).

In total 76 plant species were collected during summer and winter season belonging to 39 families and 70 genera. Mapping of local distributon of plants was made by using GIS (Geographic Information System). By using GIS seasonal plant species were arranged in map according to nature and distribution in local areas of Isakhel (Sunil et al., 2009). The study was carried out to show the relationship among the people and the plants of the area. The study showed that the people of the area have close relationship with plants and depend on them for their food, health, fuel wood and other cultural purposes (Bharucha & Pretty2010). Mostly plant species used to treat joint pains, dysentery, diarrhoea, sexual desire, stomach problems, piles, constipation, toothache, vomiting, jaundice, asthma and inflammations (Sultana & Rehman 2017). It was concluded from the study that the area has many plants that were used to treat various diseases. Local people of the area retained vast knowledge about the use of medicinal plants. Main purpose of the study was to conserve the knowledge in the form of documentation by investigating local people of the study area.

Table 1. Plants used for disease treatment by the people of Tehsil Isa Khel (Mianwali)

Serial No	Name of Plant	Family Name	Parts used	Diseases
1	*Trianthema portulacastrum* L.	Aizoaceae	Whole Plant	Jaundice,asthma,fever
2	*Amaranthusviridis* L.	Amaranthaceae	Whole plant	Snake bite,dysentery, constipation

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3	*Achyranthus asper* L.	Amaranthaceae	Whole plant	Stomach pain,cough,piles
4	*Aerva javanica* (Burm.f.) Shult.	Amarantheceae	Aerial parts	Kidney stone,inflammations
5	*Digera muricata* (L.) Mart.	Amarantheceae	Leaves,flowers	Constipation,diabetes
6	*Chenopodium album* L.	Amarantheceae	Whole plant	Jaundice,constipation,
7	*Magnefera indica* L.	Anacordiaceae	Seeds	Diarrhoea,dysentery
8	*Schinus terebinthifolia* Raddi.	Anacordiaceae	Seeds	Whooping cough,sore throat
9	*Coriandrum sativum* L.	Apiaceae	Seeds,fruits	Diarrhea,dysentery
10	*Trachyspermum ammi* Sprague	Apiaceae	Seeds	Vomiting,cough,fever
11	*Anethum graveolens* L.	Apiaceae	Whole plant	Constipation, dyspepsia
12	*Foeniculum vulgare* Milli.	Apiaceae	Seeds,fruits	Heart burn,abdominal pain,vomiting
13	*Calotropis procera* (Aiton) W.T.Aiton	Apocynaceae	Leaves, flowers,latex	Toothache,wounds, jaundice
14	*Rhazya stricta* Decne	Apocynaceae	Leaves,branches	Diabetes,dysentery, jaundice
15	*Phoenix dactylifera* L.	Arecaceae	Fruits	Sexual desire
16	*Helianthus annus* L.	Asteraceae	Seed oil	Malaria,bronchitis, cold
17	*Carthamus oxyacantha* M. Bieb.	Asteraceae	Seeds	Cancer,piles
18	*Xanthium strumarium* L.	Asteraceae	Roots, fruits,seeds	Stress,stomach diseases
19	*Sonchus arvense* L.	Asteraceae	Roots	Liver diseases,kidney diseases
20	*Conyza boneriansis* (S.Moore) Cufod.	Asteraceae	Whole plant	Dysentery,diarrhea
21	*Cordia myxa* L.	Borangiaceae	Fruits	Back pain
22	*Brassica compestris* L.	Brassicaceae	Leaves,seed oil	Constipation,abdominal pain
23	*Rphanus sativus* L.	Brassicaceae	Leaves, underground parts	Constipation,piles,gas troubles
24	*Bombax ceiba* L.	Bombaceae	Roots,bark	abdominal pain,joint pain
25	*Opuntia monacantha* Haw.	Cactaceae	Fruit,pulp,juice	diabetes,dyspepsia,piles
26	*Capparis decidua* (Forssk.) Edgew.	Capparaceae	Fruits	Blood purification, constipation
27	*Cuscuta reflexa* Roxb.	Convulaceae	Whole plant	Osteoporosis,dysentery
28	*Convolvulus arvensis* L.	Convolvulaceae	Leaves	Constipation,piles, catharsis
29	*Spinacia oleracea* L.	Chenopodiaceae	Leaves,seeds	Jaundice,constipation, difficult breathing
30	*Cucumis fistulosus* L.	Cucurbitaceae	Fruits	Constipation ,stomach diseases
31	*Citrullus colocynthis* (L.) Schrad.	Cucurbitaceae	Fruits, leaves,roots	Arthritis,toothache, digestive problems

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32	*Cyperus compressus* L.	Cyperaceae	Leaves	Diabetes,skin irritation
33	*Pongamia pinnata* (L.) Pierre.	Euphorbiaceae	Fruits,leaves	Constipation,stomach problems
34	*Euphorbia heliscopia* L.	Euphorbiaceae	Whole plant, sap	Loose motions, ringworm diseases
35	*Ricinus communis* L.	Euphorbiaceae	Seeds,leaves	Intestinal swelling, jaundice
36	*Dalbergia sisso* Roxb.	Fabaceae	Leaves,twig	Athlets foot,ringworm
37	*Acacia nilotica* L.	Fabaceae	Leaves,fruits, gum	Eye diseases,sexual desire
38	*Cassia fistula* L.	Fabaceae	Fruits,flowers, leaves	Constipation,indigestion
39	*Albizia lebeck* (L.) Benth.	Fabaceae	Seeds,flower, bark	Headache,piles,skin diseases
40	*Mentha longifolia*(L.) Huds	Lamiaceae	Aerial parts	Vomiting,dysentery
41	*Allium cepa* L.	Lilliaceae (Asphodelaceae)	Bulb	Body pain,vomiting
42	*Allium sattivum* L.	Lilliaceae	Bulb	Fever,high blood pressure
43	*Aloe vera* (L.) Burm.f.	Lilliaceae	Whole plant, leaf gel	Acne,hair diseases
44	*Asphodelus tenuifolius* Cav.	Lilliaceae	Whole plant	Jaundice,measles,piles
45	*Punica granatum* L.	Lytheraceae	Bark,fruits, seeds	Blood purification, dysentery,diarrhea
46	*Abelmoschus esculentus* (L.) Moench	Malvaceae	Fruits	Cough,bronchial tube inflammation
47	*Melia azedarach* L.	Meliaceae	Fruits,leaves	Jaundice,allergy,blood purification
48	*Morus alba* L.	Moraceae	Leaves,fruits	Sore throat,flue
49	*Ficus benghzlensis* L.	Moraceae	Fruits ,latex, leaves	Influenza,diabetes, sexual power
50	*Morus nigra* L.	Moraceae	Fruits,leaves, bark	Sore throat,cough
51	*Ficus religiosa* L.	Moraceae	Bark,fruits	Respiratory diseases, constipation,vomiting
52	*Syzygium cumini* (L.) Skeels.	Myrtaceae	Leaves,bark, fruit	Fever,dysentery, diabetes
53	*Eucalyptus camaldulensis* Dehne.	Myrtaceae	Leaves	Flue,influenza
54	*Psidium guajava* L.	Myrtaceae	Fruits,leaves	Cough,bronchitis, constipation
55	*Peganum harmala* L.	Nitrariaceae	Leaves,seeds	Abdominal pain,body inflammation
56	*Oxalis corniculata* L.	Oxalidaceae	Whole plant	Abdominal pain , stomach problems
57	*Cynodon dactylon* (L.) Pers.	Poaceae	Leaves,roots	Fever,burning sensation of feet

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58	*Cymbopogon jwarancusa* (Jones) Schulf.	Poaceae	Aerial parts	Cholera,typhoid,measles
59	*Phylaris minor* L.	Poaceae	Seeds,leaves	Cough,fever
60	*Pennisetu glaucum* (L.) R.Br.	Poaceae	Whole plant	Heart diseases,skin diseases
61	*Portulaca oleraceae* L.	Portulaceae	Whole plant	Respiratory diseases, excess water
62	*Anagalis arvensis* L.	Primulaceae	Whole plant	Convulsions,arthritis, kidney problems
63	*Ziziphus nummularia* (Burm.f.) Wight.	Rhamnaceae	Fruits,leaves	Diabetes,sexual desire,spines
64	*Rosa Gruss an taplitz* Storrs &Harrison.	Rosaceae	Flower,juice	Constipation, dyspepsia,eye diseases
65	*Citrus cinensis* (L.) Osbeck.	Rutaceae	Fruits	Constipation,vomiting
66	*Salvadora persica* L	Salvadoraceae	Fruits,seeds	Ringworm,tooth sochets inflammations
67	*Datura innoxia* Mill.	Solanaceae	Whole plant	Body inflammations, insect bite
68	*Withania sominifera* (L.) Dunal.	Solanaceae	Whole plant	Bachache,kidney stone, diabetes
69	*Capsicum annum* L.	Solanaceae	Fruits,seeds	Joint pain,toothache, indidestion
70	*Withania coagulens* (Stocks) Dunal.	Solanaceae	Fruit,seeds	Digestive problem, diabetes
71	*Solanum surratense* Schrad & Wendl	Solanaceae	Whole plant	Cough,cold,asthma
72	*Solanum nigrum* L.	Solanaceae	Whole plant	Obesty,jaundice,ear pain
73	*Tamarix aphylla* (L.) Karst	Tamariaceae	Leaves	Pus,body inflammations
74	*Vitis vinifera* L.	Vitaceae	Fruits	Constipation,typhoid
75	*Tribulus longifolius* L.	Zygophlaceae	Seeds	Sexual desire,painful urination
76	*Fagonia indica* L.	Zygophlaceae	Whole plant	Diabetes,skin diseases,

References

Abbasi, A. M., Khan, M. A., & Zafar, M. (2013). Ethno-medicinal assessment of some selected wild edible fruits and vegetables of lesser-Himalayas, Pakistan. *Pakistan Journal of Botany, 45*, 215-222.

Abbasi, A. M., Khan, M. A., Ahmad, M., & Zafar, M. (2010). Herbal medicines used to cure various ailments by the inhabitants of Abbottabad district, North West Frontier Province, Pakistan. *Indian Journal of Traditional Knowledge, 9* (1), 175-183.

Abbasi, A. M., Khan, M. A., Ahmad, M., Zafar, M., Khan, H., Muhammad, N., & Sultana, S. (2009). Medicinal plants used for the treatment of jaundice and hepatitis based on socio-economic documentation. *African Journal of Biotechnology, 8* (8), 1643–1650.

Ahmad M., Khan M. A., Zafar, M., & Sultana, S. (2007). Treatment of common ailments by plant-based remedies among the people of district Attock (Punjab) of Northern Pakistan. *African Journal of Traditional Complementary and Alternative Medicine, 4* (1), 112-120.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Ajaib, M., Khan, Z. U. D., Khan, N., & Wahab, M. (2010). Ethnobotanical studies on useful shrubs of District Kotli, Azad Jammu & Kashmir, Pakistan. *Pak. Journal of Botany, 42* (3), 1407-1415.

Akbar, S. (2020). Achyranthes aspera L.(Amaranthaceae). In *Handbook of 200 medicinal plants: a comprehensive review of their traditional medical uses and scientific justifications* (pp. 69-80). Cham: Springer International Publishing.

Akhtar, J., Siddique, K. M., Bi, S., & Mujeeb, M. (2011). A review on phytochemical and pharmacological investigations of miswak (Salvadora persica Linn). *Journal of pharmacy and bioallied sciences*, *3*(1), 113-117.

Alamgeer, Younis, W., Asif, H., Sharif, A., Riaz, H., Bukhari, I. A., & Assiri, A. M. (2018). Traditional medicinal plants used for respiratory disorders in Pakistan: a review of the ethno-medicinal and pharmacological evidence. *Chinese medicine*, *13*(1), 48.

Ali, M. S., Ahmad, V. U., Azhar, I., & Ghani, K. U. (1998). Some medicinally important plants and their uses. *Hamdard Medicus, 41*, 96-102.

Arshad, M., Nisar, M. F., Ismail, S., & Ahmad, M. (2011). Ethnobotanical Flora of District Sialkot, Punjab, Pakistan. *Middle East Journal of Scientific Research, 9* (2), 209-214.

Asfaw, M. M., & Abebe, F. B. (2021). Traditional medicinal plant species belonging to

Bharucha, Z., & Pretty, J. (2010). The roles and values of wild foods in agricultural systems. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1554), 2913-2926.

Bhattari, N. K. (1992). Folk use of plants in veterinary medicine in central Nepal. *Fitoterapia, 63* (6), 497-506.

Chandra, V. (2016). RESTORATION ETHNOBOTANY: APPLYING TRADITIONAL ECOLOGICAL KNOWLEDGE. *Indian Ethnobotany: Emerging Trends*, 58.

Chaturvedi, I., & SINGH, P. (2013). *Herbals additives: for goat production*. LAP LAMBERT Academic Publishing.

Chekole, G. (2017). Ethnobotanical study of medicinal plants used against human ailments in Gubalafto District, Northern Ethiopia. *Journal of ethnobiology and ethnomedicine*, *13*(1), 55.

Dilshad, S. M. R., Rehman, N., Iqbal, Z., Muhammad, G., Iqbal, A., & Ahmed, N., (2008). An inventory of ethnoveterinary practices for reproductive disorders in cattle and buffaloes, Sargodah district of Pakistan. *Journal of Ethnopharmacology, 117*, 393-402.

Fabaceae family in Ethiopia: a systematic review. *International Journal of Plant Biology*, *12*(1).

Farooquee, N. A. (2000). Indigenous ethno-veterinary knowledge and livestock management amongst trans human pastoralists of central Himalaya. *J. Hum. Ecology, 11*, 319-322.

Ghani, A., Ali, Z., & Perveen, S. (2012). Folk recipes and Ethnobotanical survey of medicinal plants Mianwali District, Pakistan. *International Journal of Current Pharmaceutical Research, 4*, 61-63.

Ghani, A., Mustafa, I., Ali, Z., Ishtiaq, M., Ahmed, I., & Hasan, N. (2014). Ethno-medicinal survey of plants of soon valley, Khushab District, Punjab, Pakistan. *Journal of Medicinal Plant Research, 8* (32), 1031-1034.

Giday, M., Asfaw, Z., Elmqvist, T. W., & oldu, Z. (2003). An ethnobotanical study of medicinal plants used by the Zay people in Ethiopia. *J. Ethnopharmacology, 85*, 43–52.

Gilani, S. A., Kikuchi, A., Shinwari, Z. K., Khattak, Z. I., & Watanabe, K. N. (2007). Phytochemical, pharmacological and ethnobotanical studies of Rhazya stricta Decne. *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives*, *21*(4), 301-307.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Gilani, S. A., Sherwani, S. K., Qureshi, R. A., Khan, A. M., & Sahreen, S. (2013). Medicinal plants Diversity and its indigenous use in Pakistan. *International journal of Advanced Research, 1* (5), 603-608.

Goyal, S., Chaturvedi, V., Dhingra, G., Tanwar, S., Sharma, K., & Singh, S. (2022). Trachyspermum ammi: a review on traditional and modern pharmacological aspects. *Biological Sciences*, *2*(4), 324-337.

Gul, F., Shinwari, Z. K., & Afzal, I. (2012). Screening of indigenous knowledge of hermal remedies for skin diseases among local communities of North West Punjab, Pkistan. *Pak. Journal of Botany,44* (5), 1609-1616.

Hamayun, M., Khan, S. A., Kim, H. Y., Na, C. I., & Lee, I. J. (2006). Traditional Knowledge and ex situ Conservation of Some Threatened Medicinal plants of Swat Kohistan, Pakistan. *International Journal of Botany,2* (2), 205-209.

Haq, I., & Hussain, Z. (1995). Medicinal plants of Palandri district Poonch (AJK). *Pakistan Journal of Plant Sciences, 1* (1), 115-126.

Hasanpuri, P., Kataria, N., Kumar, H., Sharma, P., Singh, N., & Yadav, S. S. (2024). An overview of ethnobotany, pharmacology, phytochemistry and phytotoxicity of Trianthema portulacastrum L. *Phytochemistry Reviews*, 1-35.

Hoareau, L., & DaSilva, E. J. (1999). Medicinal plants, a re-emerging health aid. *Electron. J. Biotechnology, 2*, 1–6.

Hussain, N., Majid, S. A., Hussain, M. A., & Abbasi, M. S. (2013). A survey of important indigenous medicinal plants of District Bhimber Azad Jammu & Kashmir, Pakistan. *International Journal of Advanced Research, 1* (7), 635-644.

Hussain, S., Ullah, F., Shah, A., Ullah, I., Mehmood, S., Gul, I., ... & Uza, N. U. (2023). Quantitative ethnomedicinal studies of wild edible fruits used by the indigenous people of the Surghar Range, Pakistan. *Ethnobotany Research and Applications*, *26*, 1-17.

Jabbar, A., Raza, M. A., Iqbal, Z., & Khan, M. N. (2006). An inventory of the ethnobotanicals. Iberian Peninsula): plants used in veterinary medicine. *Journal of Ethnopharmacology, 110*, 130–147.

Kamalakannan, K., & Balakrishna, V. (2009). Ethnobotanical studies of *Achyranthus aspera* Linn: Among the folk Peoples of Tamil Nadu, South India. *Journal of phytology,1* (2), 108-111

Kaur, G., Khichy, A., Kaur, J., Saluja, T. S., & Singh, H. (2024). Chenopodium album: Exploring the Therapeutic Values of the Magical Medicinal Herb. *Int J Health Environ Res*, *2*, 55-58.

Khan, K., Alamgeer., Erum, A., Ahmad, B., Akram, M., Aarshad, M. A., Junaid., & Saleem, U. (2009). Ethnobotanical studies from Northern Areas of Pakistan. *Pharmacologyonline,1*, 328-354.

Khan, R. U., Mehmood, S., Khan, S. U., & Jaffar, F. (2013). Ethnobotanical study of food value flora of District Bannu Khyber Pakhtunkhwa, Pakistan. *Journal of medicinal plants studies, 1*, 93-106.

Kifayatullah, M., & Waheed, I. (2014). Evaluation of Hydroethanolic extract of *Opuntia monacantha* Haw Cladodes for Antipyretic activity. *Word Journal of Pharmacy and Pharmaceutical Sciences, 3* (2), 1021-1030.

Kumar, N., & Choyal, R. (2013). Ethnomedicinal uses of some plants of Lower Foot Hills of Himachal Pradesh for the treatment of oral health prolems and other mouth disorders. *International Journal of Advanced Research, 1* (5), 1-7.

Kumar, S., Kumar, R., & Khan, A. (2011). Medicinal plant resources: Menifestation and prospects of life sustaining health care system. *Continental journal Biological Sciences, 4* (1),19-29.

Leghari, A. J., Leghari, U. A., Laghari, A. H., & Bhuttoo, T. A. (2016). Cultivation of Rose. *Journal of Floriculture and Landscaping, 2*, 1-4.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Long, C. L., & Wang, J. R. (1994). On Social andCultural Values of Ethnobotany. *J. of Plant Resources and Evironment, 3* (2), 45-50.

Mahmood, A., Malik, R. N., Shinwari, Z. K., & Mahmood, A. (2011). Ethnobotanical survey of plants from Neelum Azad Jammu Kashmir,Pakistan. *Pak j.botany, 43,* 105-110.

Mahmood, A., Mahmood, A., & Tabassum, A. (2011). Ethnobotanical survey of plants from District Sialkot, Pakistan. *Journal App Pharm, 2* (3), 1212-1220.

Mahmood, A., Malik, R. N., Shinwari, Z. K., & Mahmood, A. (2011). Ethnobotanical survey of plants from Neelum Azad Jammu Kashmir,Pakistan. *Pak j.Botany, 43*, 105-110.

Martin, G. J. (2010). *Ethnobotany: a methods manual*. Routledge.

Meena, A. K., Yadav, A., & Rao, M. M. (2011). Ayurvedic uses and pharmacological activities of Calotropis procera Linn. *Asian journal of traditional medicines*, *6*(2), 45-53.

Mondal, T., & Biswas, S. (2012). Documentation on some ethnoveterinary medicinal plants of Bankura District,West Bangal, India. *Life sciences leaflets, 6*, 42-46.

Mozaffarpur, S. A., Naseri, M., Esmaeilidooki, M. R., Kamalinejad, M., & Bijani, A. (2012). The effect of cassia fistula emulsion on pediatric functional constipation in comparison with mineral oil: a randomized, clinical trial. *DARU Journal of Pharmaceutical Sciences*, *20*(1), 83.

Nair, M. B., & Groot, M. J. (2021). Medicinal plants for Home herbal gardens, Institutional gardens and animal health. *Natural livestock farming india*, 45-50.

Nfi, A. N., Mbanya, J. N., Ndi, C., Kameni, A., Vabi, M., Pingpoh, D., Yonkeu, S. & Moussa, C. (2001). Ethnoveterinary medicine in the Northern Provinces of Cameroon. *Vet. Res. Commun., 25*, 71–76.

Ole-Miaron, J. O. (2003). The Maasai ethnodiagnostic skill of livestock diseases: a lead to traditional bioprospecting. *J. Ethnopharmacol,84*, 79–83.

Panhwar, A. Q. & Abro, H. (2007). Ethnobotanical studies of Mahal Kohistan. *Pak j.Bot, 39* (7), 2301-2315.

Qaisar, M., Farooq, S., Gilani, S. N., Wasim, M. A., Kakar, M., Shah, S. W. A., & Rauf, A. (2013). Ethnobotanical survey of medicinal plants in Wazir and Daur Tribes of North Waziristan, Pakistan. *Global Veterinaria, 11* (3), 285-292.

Qureshi, R. A., & Ghufran, M. A. (2005). Medicinal value of some important roses and allied species of Northeren Area of Pakistan. In: Pakistan Rose Annual. (Ed.): Hashmi, M. Pictorial Printers (Pvt.). Ltd. Islamabad, 24-29.

Qureshi, R. A., Ahmad, I., & Ishtiaq, M. (2006). Ethnobotanical and Phytosociological studies of Tehsil Gujar Khan District Rawalpindi. *Journal of plant sciences, 5* (5), 890-893.

Qureshi, S. J., & Khan, M. A. (2001). Ethnobotanical study of Kahuta from Rawalpindi District Pakistan. *Journal of Biological Sciences, 1* (1), 27-30.

Qureshi, S. J., Khan, M. A., & Ahmad, M. (2008). A survey of useful medicinal plants of Abbottabad in Northern Pakistan. *Trachia Journal of Sciences, 6* (4), 39-51.

Sethi, A. K. (2007). *Combating Allergy Naturally*. Pustak Mahal.

Sharma, M., Sharma, M., Bithel, N., & Sharma, M. (2022). Ethnobotany, phytochemistry, pharmacology and nutritional potential of medicinal plants from asteraceae family. *J Mt Res*, *17*(2), 67-83.

Shinwari, S., Qureshi, R., & Baydoun, E. (2011). Ethnobotanical study of Kohat Pass, Pakistan. *Pak. journal of Botany, 43,* 135-139.

Singh, H. (2008). Importance of local names of some useful plants in ethnobotanical study. *Indian Journal of Traditional Knowledge*, *7*(2), 365-370.

Sultana, R., & Rahman, A. M. (2017). Academic Journal of Life Sciences. *Academic Journal of Life Sciences*, *3*(9), 52-78.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Sunil, N., Sivaraj, N., Anitha, K., Abraham, B., Kumar, V., Sudhir, E., ... & Varaprasad, K. S. (2009). Analysis of diversity and distribution of Jatropha curcas L. germplasm using Geographic Information System (DIVA-GIS). *Genetic Resources and Crop Evolution*, *56*(1), 115-119.

Tareen, R. B., Bibi, T., Khan, M. A., Ahmad, M., & Zafar, M. (2010). Indigenous Knowledge of Folk Medicine By The Women of Kalat and Khuzdar Regions of Balochistan, Pakistan. *Pak. Journal of Botany,* 42 (3), 1465-1485.

Wanzala, W., Zessin, K. H., Kyule, N. M., Baumann, M. P. O., Mathias, E., & Hassanali, A. (2005). Ethnoveterinary medicine: a critical review of its evolution, perception, understanding and the way forward. *Livestock Res. Rural Dev,17* (11).

Yirga, G., Teferi, M., Berhane, G.,& Amare, S. (2012). Plants used in ethnoveterinary practices inMedebay Zana District, Northern Ethiopia. *Journal of Medicinal Plants Research,* 6 (3), 433-438.