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Cultural and Ethnopharmacological Uses of Wild Plants in the Cholistan Desert, Pakistan

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SUMMARY

Wild plants have been utilized by humans since the origin of humanity; they are utilized for food, fodder, medicine, superstition, trade, entertainment, religion, magic, timber, firewood, repelling insects, lizards, and rodents; as barriers, for fragrance, and as preservatives. Landscape, climate, and human attitudes change due to the rapid increase in the human population. People are becoming more dependent on modern materials and medications. Societies lose their cultural and ethnopharmacological data. Therefore, this study was designed to evaluate the cultural and ethnopharmacological information in the Cholistan Desert. Data were collected from the native respondents (n=100) of Cholistan. The data were analyzed with the help of different indices like the Relative Frequency of Citation (RFC), relative importance, and Similarity Index. Parts of plants (i.e., pod, bark, leaf, fruit, twig, root, stem, latex, and whole plant) from 23 species are used orally and topically to treat the following diseases: anemia, cancer, cough, diabetes, fatigue, fever, gastrointestinal issues, gut health, indigestion, insect bites, jaundice, joint pain, liver issues, livestock health, malnutrition, milk production, muscle pain, oral health, skin infections, swelling, tooth pain, urinary disorders, weakness, and wound healing. The relative frequency of citation (RFC) ranged from 0.02 to 0.86. Giant milkweed has the highest RFC (0.86), while the lowest was noted for saltwort and seepweed (RFC = 0.02).

Keywords: Ethnobiology, Ethnomedicine, Wild plants, Human health, Food, Fodder

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INTRODUCTION

Historically, people have utilized plants for numerous purposes such as food, medicine, shelter, decoration, construction, and clothing (Balick and Cox, 2020; Izah et al., 2024). Indigenous and local communities rely on traditional ethnobotanical knowledge, which has been passed down orally and through practice from generation to generation, to guide their use of plants (Umair et al., 2017; Chele et al., 2025). However, scientists have played a significant role in unraveling and documenting plant-human relationships, as well as unlocking knowledge through various forms of interviews and surveys (Hsu and Harris, 2022; Umair et al., 2024). Additionally, archaeological, paleontological, and archaeogenetic evidence has recently been used to reconstruct plant-human relationships from prehistoric periods. Ethnobotany is a subject that operates at the interface of plants, people, and science; as a result, ethnobotanists can serve as a bridge between the two. The results of plant-human interactions, as decoded by researchers, have immense potential to tackle some of the world's current problems (Amjad et al., 2020). The shared global issues we face today include eradicating poverty, achieving zero hunger, increasing people's nutritional status, supporting sustainable agriculture, improving health, providing affordable health care services, and battling climate change (Umair et al., 2019; Naz et al., 2022).

Humans have eaten wild edible plants found in their environment since prehistoric times. These days, wild edible plants are being re-evaluated and are important for ecology, economy, and nutrition (Hatzilazarou et al., 2023). Wild edible plants are a good source of vital nutrients for the human diet, including proteins, fats, and carbohydrates, according to numerous studies (Motti, 2022; Singh et al., 2022). Additionally, the ethnobotany of wild edible plants has been regarded as one of the best methods for assessing applicants for the creation of novel cuisines. These basic materials do, however, carry some hazards, either from the substances found in the plants themselves (such as some alkaloids and mono-terpenes) or from bio-accumulated substances resulting from human activities (such as heavy metals or pesticides). For instance, pesticides are frequently used in traditional crops, and as the majority of wild edible plants are now grown, the likelihood of discovering pesticide residues is significant. Additionally, the absorption of micro- and nanoplastics by plants and the potential health impacts of exposure to them should receive particular consideration (Hankiso et al., 2023; Fang et al., 2024; Awoke et al., 2025; Ergun et al., 2025).

Traditional knowledge about the cultural and ethnopharmacological uses of native plant species is rapidly disappearing in the Cholistan Desert due to socioeconomic changes, climatic variations, and increased human-induced pressures. The potential relevance of this traditional knowledge in primary healthcare and future pharmacological breakthroughs is limited because a large percentage of it, preserved through oral sharing within local communities, is not documented and may disappear with the older population. Furthermore, despite Cholistan's biological uniqueness, there is a lack of comprehensive and systematic studies that integrate cultural beliefs with the usage of medicinal plants, resulting in a significant deficiency in both ethnobotanical documentation and conservation efforts. In order to establish a scientific basis for future research and sustainable management strategies, the current study aims to document and investigate the cultural and ethnopharmacological applications of plant species in the Cholistan Desert, evaluate their significance and usage patterns, and highlight their potential contributions to healthcare and biodiversity conservation.

MATERIALS AND METHODS

Data were collected from Cholistan (study sites i.e. Fort Abbas, Mauj Garh, Din Garh, Derawar, Bukan Pur, Nawan Kot, Bijnot, Islam Garh and Bhagla) (Figure 1) from January 2022 to December 2025. Cultural and ethnopharmacological data were examined qualitatively and quantitatively respectively. The Cholistan map was created using ArcGIS (version 10.4), while the graphs were created using Microsoft

Excel (version 2010), PAST Statistical Software (version 5.1), and OriginPro (version 2023).

STUDY AREA

The Cholistan Desert, also known as Rohi, is a desert in Punjab's Bahawalpur Division that stretches into Sindh and the Indian state of Rajasthan. Cholistan was a caravan trading center; hence, multiple forts were built to protect trade routes throughout the medieval period, the best-preserved of which is the Derawar Fort. Cholistan spans 25,800 km² in the Bahawalpur Division of Punjab. The nearest large city is Bahawalpur, which is 30 kilometers from the edge of the desert. The desert is approximately 480 kilometers long and 32 to 192 kilometers wide. It is situated between 27°42'00" and 29°45'00" north and 69°57'30" to 72°52'30" east. The desert is 80% sandy, with the remaining 20% made up of alluvial plains and small sandy dunes. Climate of Cholistan is described as an arid and semi-arid tropical desert with extremely low yearly humidity. The average temperature of Cholistan is 28.33 °C, with July being the hottest month, with a mean temperature of 38.5 °C. Summer temperatures can exceed 46 °C and occasionally reach 50 °C during droughts. Winter temperatures can drop to 0 °C (32 °F). Although droughts are frequent, Cholistan receives upto 180 mm of rainfall on average, with July and August being the rainiest months (Hussain and Altaf, 2023).

STATISTICAL ANALYSIS

The data were analyzed with the help of different indices like the Relative Frequency Citation (RFC), relative importance, and Similarity Index.

RELATIVE FREQUENCY CITATION (RFC)

The relative frequency citation (RFC) is used to determine the relative frequency of references or mentions from study participants who acted as informants and is calculated using the following formula (Altaf, 2016; Rahman et al., 2022; Iqbal et al., 2023; Khan et al., 2024; Jahangeer et al., 2026):

$$RFC = FC/N$$

Where FC is the number of informants who named or mentioned the plant, and N is the overall number of informants. The values closest to 1 indicate that virtually all of the informants reported a specific medicinal plant that was used to treat a specific condition, whereas low scores indicate that the usage or purpose of a medicinal plant species is stated by only a few, if any, informants.

RELATIVE IMPORTANCE (RI)

The relative importance of medicinal wild plants based on the usage or disease category was determined using relative importance (RI) and computed as follows (Motti, 2022):

$$RI = [RFC_{(max)} + RNU_{(max)}]/2$$

Where

$RFC_{(max)}$ is the RFC of the medicinal wild plant species, which is calculated by dividing the frequency citation of one species (FC) by the frequency citation of the species with the maximum frequency. The relative number of use categories,

$RNU_{(max)}$, is calculated by dividing the number of use or disease categories of a certain species (NU) by the number of use categories of the species with the most use or disease categories (NU_{max}).

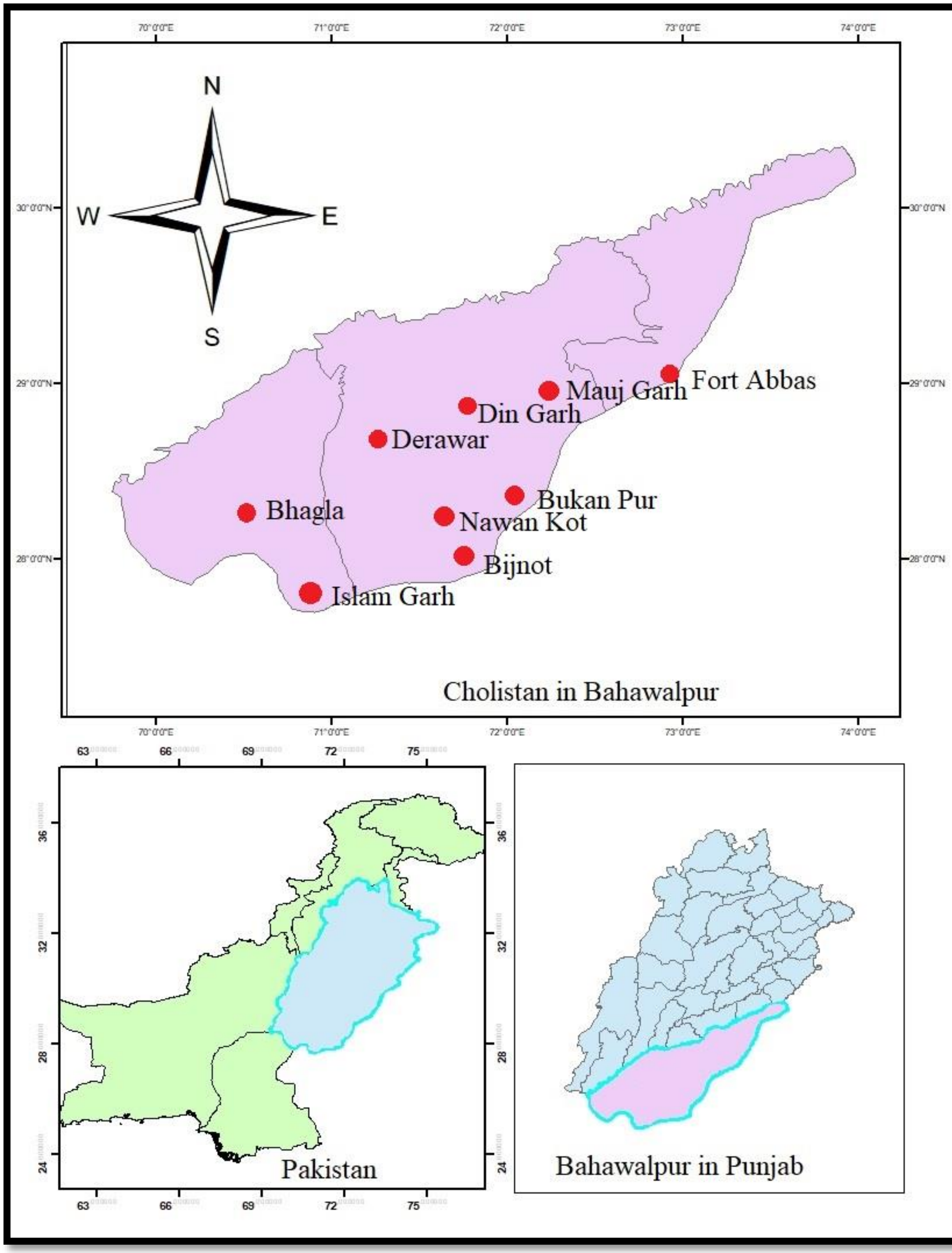

Figure 1: Map of the study area along with study sites i.e. Forst Abbas, Mauj Garh, Din Garh, Derawar, Bukan Pur, Nawan Kot, Bijnot, Islam Garh and Bhagla.

SIMILARITY INDEX

Similarity Index is calculating by the given formula (Altaf, 2016; Altaf et al., 2017; Altaf et al., 2018; Adil et al., 2022; Haidar et al., 2026):

$$SI = PSD_P / PSD_S$$

While,

PSD is a wild plant species used to treat diseases, "$_P$" refers to the recent study/present study, and "$_S$" indicates similar diseases cured by specific wild plant species in both present and previous record.

RESULTS AND DISCUSSION

Out of the 100 respondents interviewed in Pakistan's Cholistan Desert, 98 were men and only 2 were women. The majority of respondents (n = 31) described themselves as shepherds, followed by farmers (n = 17), shopkeepers (n = 14), traditional healers (n = 4), students (n = 3), and housewives (n = 2). Out of a total of 39 respondents, 39 were between the ages of 18 and 40; 24 were between the ages of 41 and 50, and only 13 were between the ages of 51 and 60. The age distribution revealed a greater representation of people over 60. According to the informants' educational status, 33% of them were illiterate (n = 33) while other respondents (67%) had varied levels of education, including primary (n = 28), intermediate (n = 25), graduate (n = 8), and matric (n = 6) (Figure 2).

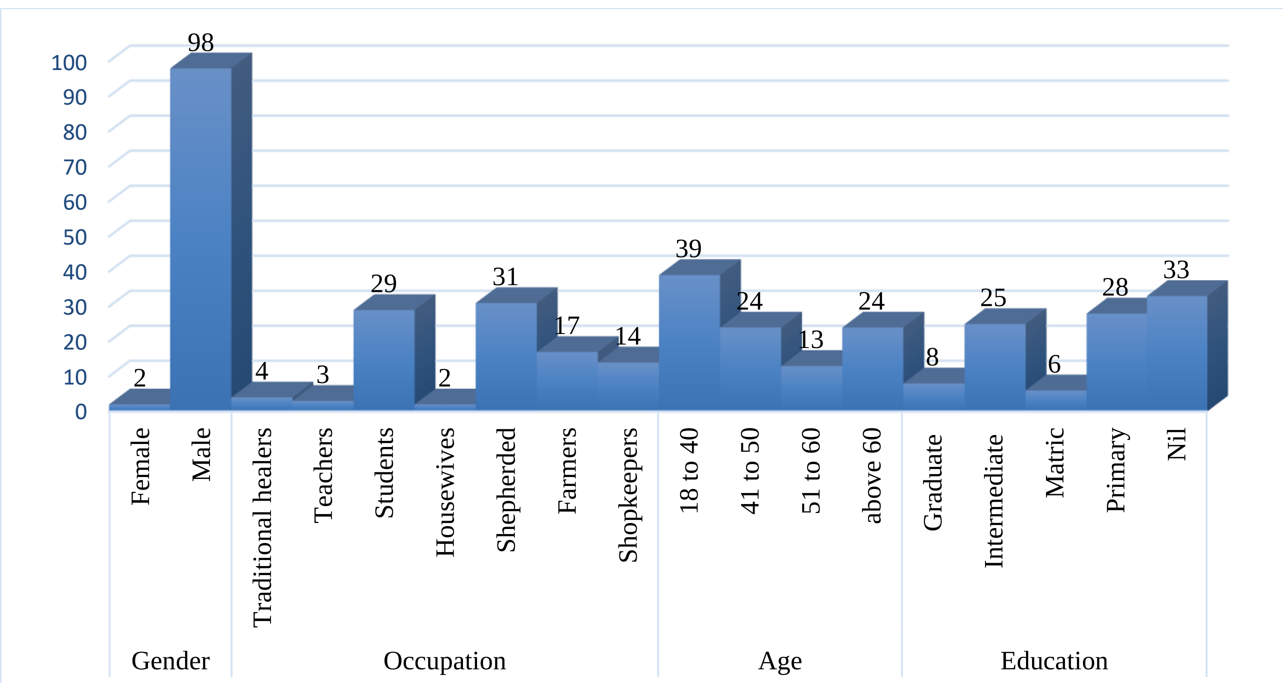

Figure 2: Respondents of the study area.

CULTURAL USES OF PLANTS

According to the respondents, these nine species of plants (i.e., *Ziziphus mauritiana*, *Phoenix dactylifera*, *Calligonum polygonoides*, *Capparis decidua*, *Salvadora persica*, *Prosopis cineraria*, *Crotalaria burhia*, *Acacia nilotica*, and *Calotropis gigantea*) are used as food in the Cholistan Desert. During the survey, it was noted that 22 species of plants (i.e., *Prosopis cineraria*, *Tamarix aphylla*, *Acacia nilotica*, *Ziziphus mauritiana*, *Salvadora persica*, *Caroxylon imbricatum*, *Suaeda fruticosa*, *Heliotropium crispum*, *Prosopis juliflora*, *Vachellia jacquemontii*, *Crotalaria burhia*, *Cynodon dactylon*, *Phoenix dactylifera*, *Calligonum polygonoides*, *Capparis decidua*, *Sporobolus ioclados*, *Calotropis gigantea*, *Tamarix dioica*, *Cenchrus ciliaris*, *Lasiurus scindicus*, *Saccharum munja*, and *Leptochloa fusca*) are used as fodder in the study area (Figure 3). These findings were in agreement to Hussain and Altaf (2023).

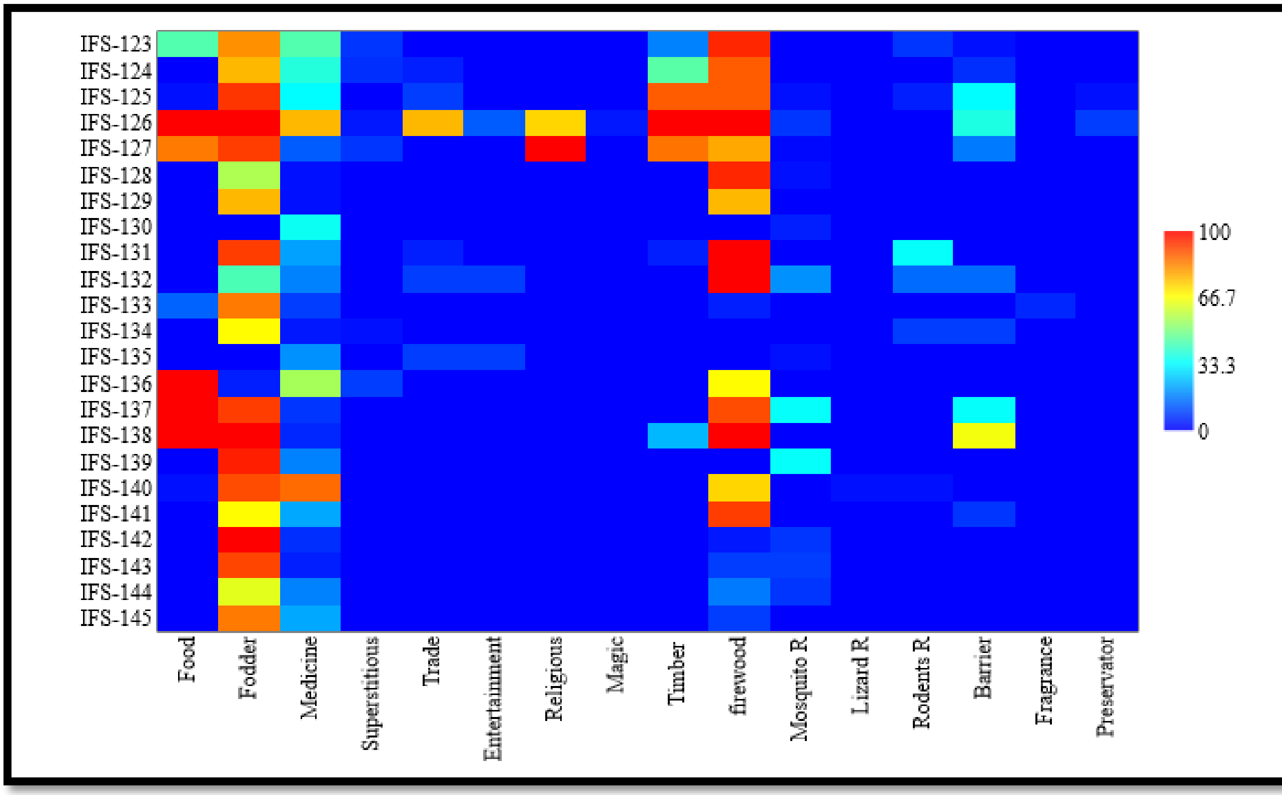

Figure 3: Cultural uses of flora in Cholistan (codes are present in Table 1).

People in the study area used these plant species (i.e. *Tamarix aphylla, Acacia nilotica, Ziziphus mauritiana, Prosopis juliflora, Vachellia jacquemontii, and Saccharum spontaneum*) as trade for timber, firewood, and fodder. During the survey, it was noted that three species of plants (i.e., *Ziziphus mauritiana*, *Vachellia jacquemontii*, and *Saccharum spontaneum*) are used to make sports materials like a bat (locally known as balla) and a traditional stick-and-peg game (locally known as gulli danda) in the study area (Figure 3). These findings align with the results of other scientists (Abbasi et al., 2013; Kunwar et al., 2021; Hussain and Altaf, 2023).

Out of total, six plant species, i.e., *Prosopis cineraria*, *Tamarix aphylla*, *Ziziphus mauritiana*, *Salvadora persica*, *Cynodon dactylon*, and *Phoenix dactylifera* are recognized as good omens for them. It is documented that the people of the study area believe that *Ziziphus mauritiana* is beneficial according to Islam and is also used in magic, and that *Salvadora persica* is spiritually significant (Figure 3). These findings were in agreement to Hussain and Altaf (2023).

Respondent told that 7 species, i.e. *Prosopis cineraria*, *Tamarix aphylla*, *Acacia nilotica*, *Ziziphus mauritiana*, *Salvadora persica*, *Prosopis juliflora* and *Capparis decidua* are used in timber, while 19 species of plants, i.e. *Prosopis cineraria*, *Tamarix aphylla*, *Acacia nilotica*, *Ziziphus mauritiana*, *Salvadora persica*, *Caroxylon imbricatum*, *Suaeda fruticosa*, *Prosopis juliflora*, *Vachellia jacquemontii*, *Crotalaria burhia*, *Phoenix dactylifera*, *Calligonum polygonoides*, *Capparis decidua*, *Calotropis gigantean*, *Tamarix dioica*, *Cenchrus ciliaris*, *Lasiurus scindicus*, *Saccharum munja* and *Leptochloa fusca* are used as firewood (Figure 3). These findings align with the study of other scientists (Sackser et al., 2025).

According to informants, 12 species of plants (i.e., *Acacia nilotica, Ziziphus mauritiana, Salvadora persica, Caroxylon imbricatum, Heliotropium crispum, Vachellia jacquemontii, Saccharum spontaneum, Calligonum polygonoides, Sporobolus ioclados, Cenchrus ciliaris, Lasiurus scindicus*, and *Saccharum munja*) are used as mosquito repellents, while only one species, i.e., *Calotropis gigantea*, is used as a lizard repellent. Additionally, 6 species, i.e., *Prosopis cineraria*, *Acacia nilotica*, *Prosopis juliflora*, *Vachellia jacquemontii*, *Cynodon dactylon*, and *Calotropis gigantea*, are used as rodent repellents. Smoke from plants is used to repel insects, while thorny plants are used to repel rodents and lizards. Ten species of plants (i.e., *Prosopis cineraria*, *Tamarix aphylla*, *Acacia nilotica*, *Ziziphus mauritiana*, *Salvadora persica*, *Vachellia jacquemontii, Cynodon dactylon, Calligonum polygonoides*, *Capparis decidua*, and *Tamarix dioica*) are used as barriers by local people to prevent wind and wild fauna (Figure 3). These findings support to the research of other scientists (Karunamoorthi and Hailu, 2014).

Only one plant species (i.e., *Crotalaria burhia*) is noted for its fragrance according to very few respondents (n=5). Only two species (i.e., *Acacia nilotica* and *Ziziphus mauritiana*) are used to preserve food; leaves of these plants are used for preservation, while very few respondents are aware of this technique (Figure 3).

ETHNOPHARMACOLOGICAL USES OF WILD PALNTS

A total of 23 species i.e., *Prosopis cineraria*, *Tamarix aphylla*, *Acacia nilotica*, *Ziziphus mauritiana*, *Salvadora persica*, *Caroxylon imbricatum*, *Suaeda fruticosa*, *Heliotropium crispum*, *Prosopis juliflora*, *Vachellia jacquemontii*, *Crotalaria burhia*, *Cynodon dactylon*, *Saccharum spontaneum*, *Phoenix dactylifera*, *Calligonum polygonoides*, *Capparis decidua*, *Sporobolus ioclados*, *Calotropis gigantea*, *Tamarix dioica*, *Cenchrus ciliaris*, *Lasiurus scindicus*, *Saccharum munja*, and *Leptochloa fusca*) (Table 1) of plant parts (i.e., pod, bark, leaf, fruit, twig, root, stem, latex, and whole plant) (Figure 4) are used orally and topically (Figure 5) to treat the following diseases: anemia, cancer, cough, diabetes, fatigue, fever, gastrointestinal issues, gut health, indigestion, insect bites, jaundice, joint pain, liver issues, livestock health, malnutrition, milk production, muscle pain, oral health, skin infections, swelling, tooth pain, urinary disorders, weakness, and wound healing (Figure 6).

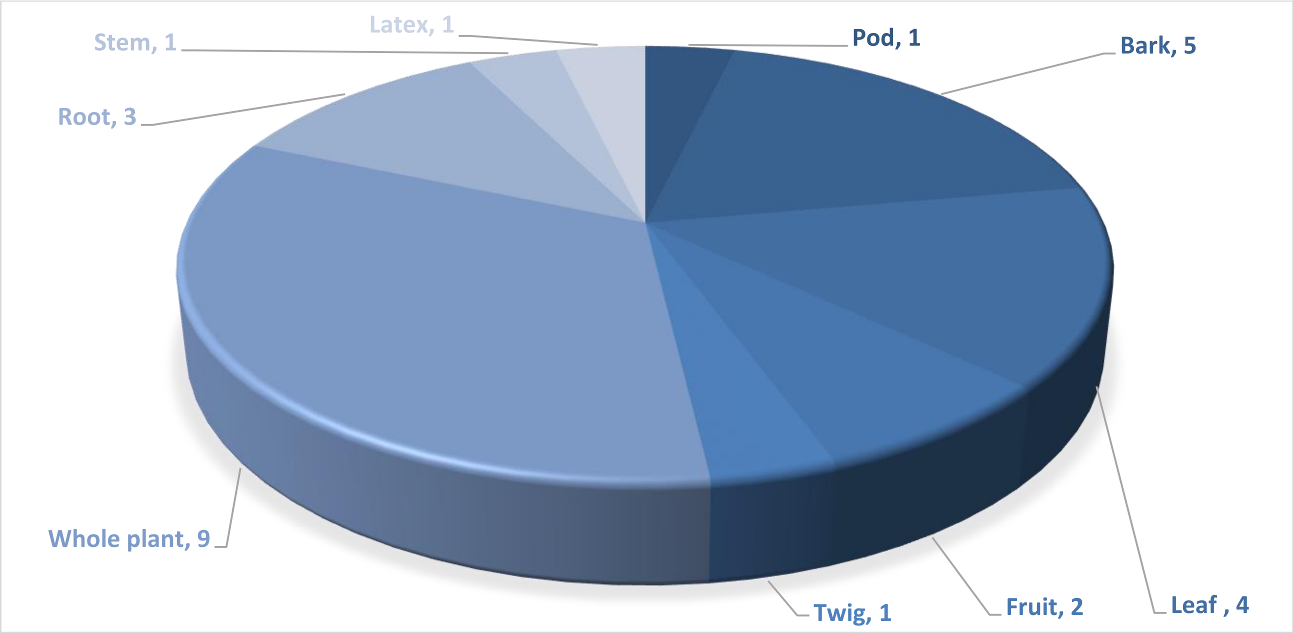

Figure 4: Parts of wild plants used for ethnomedicine in the study area.

Table 1: List of wild plants in the study area.

Sr.	**Vernacular names**	**Name**	**Family**	**Dispatch/ code**
1	Jandi	*Prosopis cineraria* (L.) Druce Persian Mesquite	Fabaceae	IFS-123
2	Frash	*Tamarix aphylla* (L.) H.Karst. Athel	Tamaricaceae	IFS-124
3	Kikar	*Acacia nilotica* (L.) Willd. ex Delile Gum Arabic Tree	Fabaceae	IFS-125
4	Beri	*Ziziphus mauritiana* Lam. Indian Jujube	Rhamnaceae	IFS-126
5	Peelo	*Salvadora persica* L. Toothbrush Tree	Salvadoraceae	IFS-127
6	Lani	*Caroxylon imbricatum* (Forssk.) Moq. Saltwort	Amaranthaceae	IFS-128
7	Kali lani	*Suaeda fruticosa* Forssk. ex J.F.Gmel. Seepweed	Amaranthaceae	IFS-129
8	Kali bui	*Heliotropium crispum* Desf. Wild Heliotrope	Boraginaceae	IFS-130
9	Maskat	*Prosopis juliflora* (Sw.) DC. Mesquite	Fabaceae	IFS-131
10	Kikar	*Vachellia jacquemontii* (Benth.) Ali Desert Thorn Acacia	Fabaceae	IFS-132
11	Chag	*Crotalaria burhia* Buch.-Ham. ex Benth. Khimp	Fabaceae	IFS-133
12	Kaa	*Cynodon dactylon* L. Bermuda grass	Poaceae	IFS-134
13	Kana	*Saccharum spontaneum* L. Wild sugarcane	Poaceae	IFS-135
14	Khajor	*Phoenix dactylifera* L. Date palm	Arecaceae	IFS-136
15	Phog	*Calligonum polygonoides* L. Desert wire shrub	Polygonaceae	IFS-137
16	Karir	*Capparis decidua* (Forssk.) Edgew. Desert caper	Capparaceae	IFS-138
17	Swag	*Sporobolus ioclados* (Nees ex Trin.) Nees Wild desert grass	Poaceae	IFS-139
18	Aak	*Calotropis gigantea* (L.) W.T.Aiton Giant milkweed	Apocynaceae	IFS-140
19	Khagal	*Tamarix dioica* Roxb. ex Roth Desert tamarisk	Tamaricaceae	IFS-141
20	Dhaman	*Cenchrus ciliaris* L. Desert fodder grass	Poaceae	IFS-142
21	Sewen kaa	*Lasiurus scindicus* Henrard Desert feather grass	Poaceae	IFS-143
22	Sarkanda	*Saccharum munja* Roxb. Wild cane grass	Poaceae	IFS-144
23	Kalar ghass	*Leptochloa fusca* (L.) Kunth Brown Beetle-grass	Poaceae	IFS-145

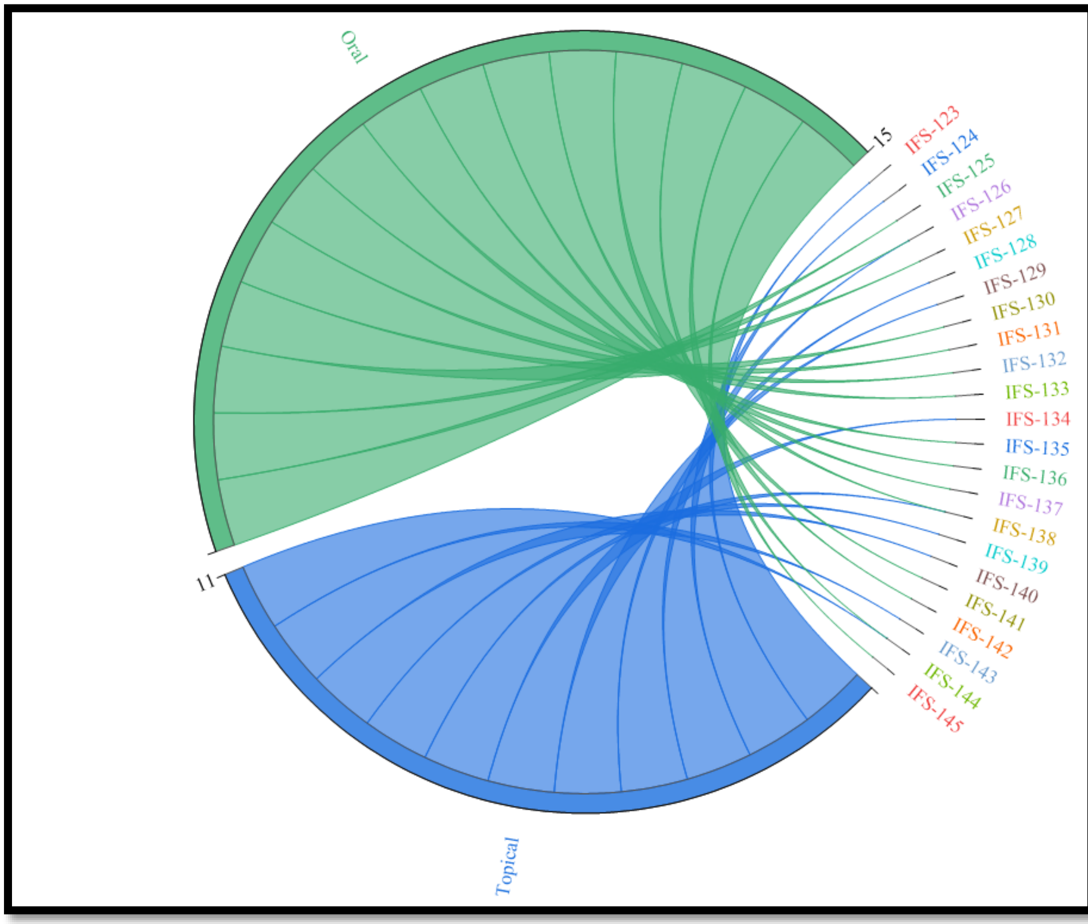

Figure 5: Mode of used (oral and topical) for ethnomedicine in the study area (Codes are present in Table 1).

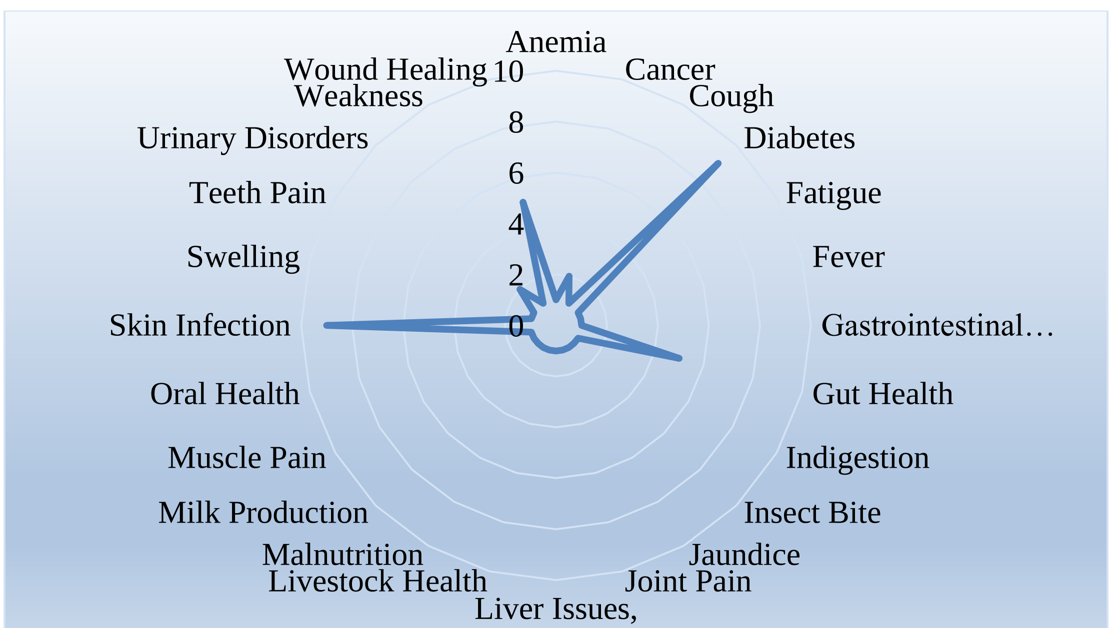

Figure 6: Diseases treated with the help of wild plants in the study area.

These plant species i.e. *Saccharum spontaneum, Sporobolus ioclados, Phoenix dactylifera, Calligonum polygonoides, Caroxylon imbricatum, Heliotropium crispum, Lasiurus scindicus, Saccharum munja, Acacia nilotica, Salvadora persica, Prosopis juliflora, Vachellia jacquemontii, Cynodon dactylon, Cenchrus ciliaris* and *Leptochloa fusca* are reported for the first time. These species of plants have no previous reports, and they are used to cure the following diseases: anemia, cancer, diabetes, fatigue, fever, gastrointestinal issues, gut health, jaundice, joint pain, livestock health, malnutrition, milk production, oral health, skin infection, swelling, tooth pain, weakness, and wound healing.

These plant species, i.e., *Prosopis cineraria*, *Tamarix aphylla*, *Ziziphus mauritiana*, *Capparis decidua*, *Calotropis gigantea*, and *Tamarix dioica*, are used to treat various diseases and also have previous reports of curing diseases in various literature, with a Similarity Index (SI) ranging from 0.5 to 1.0. *Calotropis gigantea* is used to cure insect bites and has also been previously used to treat asthma, snake bites, pain, wounds, and epilepsy (Gupta and Wagh, 2024; Kalita et al., 2024; Panaskar et al., 2024; Pandey et al., 2024), and it has the highest SI (1.0). *Prosopis cineraria* is used to cure muscle pain, wounds, skin infections, and was also previously used to cure liver, bladder, eye, skin, and pancreatic problems, joint pain, ulcers (Malik et al., 2015; Umair et al., 2017; Umair et al., 2019; Saeed et al., 2022; Perveen et al., 2024), fever, and cancer (Al Saidi et al., 2024; Awasthi et al., 2024; Kalaivani and Mathubala, 2024) with a significance index of 0.67 (SI). *Tamarix aphylla* is used to cure wound healing, and skin infections; and was also previously used to cure wounds, boils, cough, cold, sexual weakness, stomach and eye problems (Malik et al., 2015; Umair et al., 2017; Umair et al., 2019; Shah et al., 2021; Perveen et al., 2024; Umair et al., 2024) and fever (Altemani et al., 2024; Hamed et al., 2024) with a significance index of 0.5 (SI). *Ziziphus mauritiana* is used to cure skin infections and diabetes; and was also previously used to cure asthma, digestive issues, ulcers, toothache, diarrhea (Umair et al., 2017; Umair et al., 2019; Shah et al., 2021; Waheed et al., 2023) and diabetes (Ould Belle et al., 2024; Ralte and Singh, 2024; Yebouk et al., 2025); with a significance index of 0.5 (SI). *Capparis decidua* is used to cure diabetes, gut health, skin infection and was also previously used to cure diabetes, stomach, skin, lung and liver issues, anemia, impotency, fevers and pain (Umair et al., 2017; Naz et al., 2022; Saeed et al., 2022; Hussain and Altaf, 2023; Waheed et al., 2023; Umair et al., 2024); with a significance index of 0.67 SI). *Tamarix dioica* is used to cure diabetes, liver issues and was also previously used to **cure** gut, Lung, spleen and liver problems (Naz et al., 2022; Gogoi et al., 2023) with a significance index of 0.5 (SI) (Table 2).

RELATIVE FREQUENCY OF CITATION

The relative frequency of citation (RFC) ranged from 0.02 to 0.86. Giant milkweed has the highest RFC (0.86), followed by Indian jujube (RFC = 0.76), date palm (RFC = 0.55), Persian mesquite (RFC = 0.44), Athel (RFC = 0.38), wild heliotrope (RFC = 0.35), gum Arabic tree (RFC = 0.33), brown beetle-grass (RFC = 0.22), desert tamarisk (RFC = 0.19), mesquite (RFC = 0.19), desert thorn acacia, wild desert grass, wild cane grass (RFC = 0.17), toothbrush tree (RFC = 0.12), while the lowest was noted as saltwort and seepweed (RFC = 0.02) (Figure 7). These findings align with the research of other scientists (Altaf, 2016).

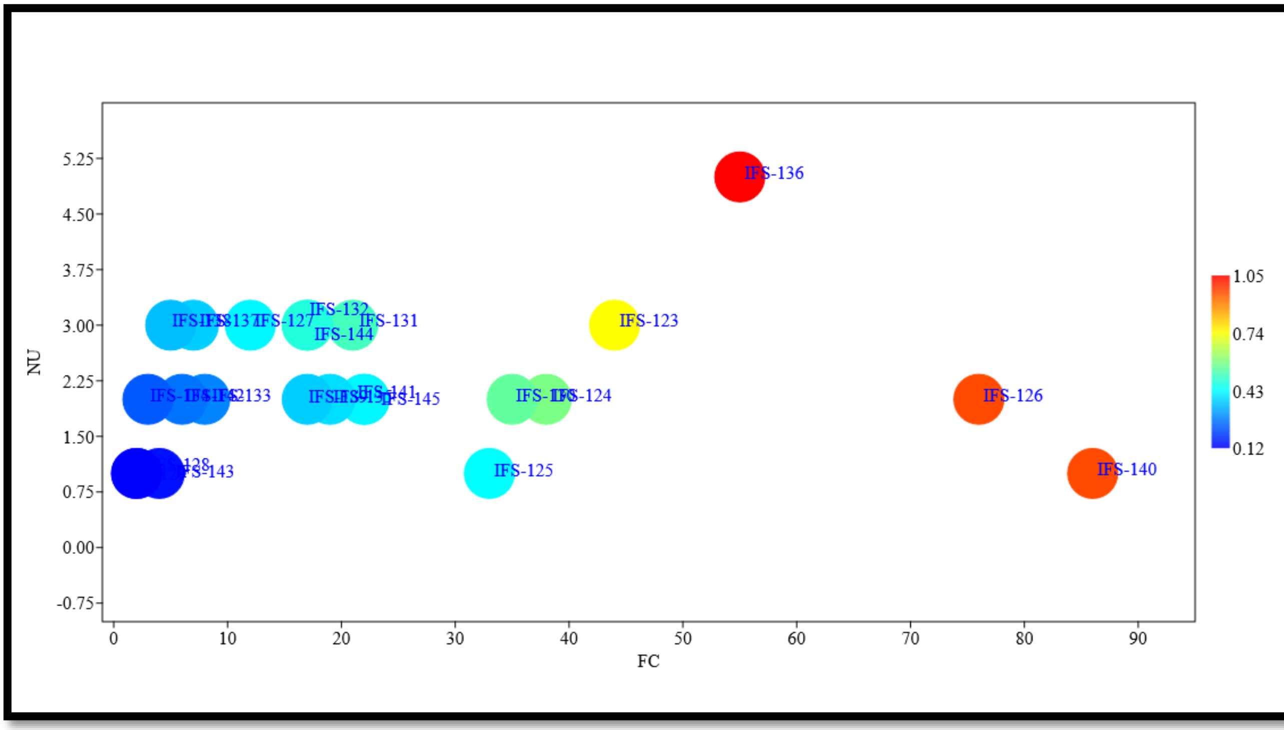

Figure 7: Graph showing the NU (Number of diseases), FC (Frequency of citation) and RI (Relative importance through color variation) comparative values.

RELATIVE IMPORTANCE (RI)

The relative importance (RI) ranged from 1.05 to 0.12. During the study, it was noted that the highest relative importance (RI = 1.05) was for date palm, followed by giant milkweed, Indian jujube (RI = 0.96), Persian mesquite (RI = 0.74), athel (RI = 0.58), wild heliotrope (RI = 0.55), mesquite (RI = 0.51), wild cane grass, desert thorn acacia (RI = 0.47), gum Arabic tree (RI = 0.43), toothbrush tree, desert tamarisk, brown beetle-grass (RI = 0.42), wild sugarcane (RI = 0.39), desert wire shrub, wild desert grass (RI = 0.37), and desert caper (RI = 0.35), and the lowest relative importance (RI = 0.12) was noted for saltwort and seepweed (Figure 8). These findings align with the study of other scientists (Ralte and Singh, 2024).

CONCLUSION

A comprehensive ethnobotanical study in the Cholistan Desert reveals that local wild plant life plays a crucial role in the healthcare, nutrition, and cultural continuity of native communities, despite existing socioeconomic and environmental challenges. The study documents 23 wild plant species, including 15 (i.e. *Saccharum spontaneum*, *Sporobolus ioclados*, *Phoenix dactylifera*, *Calligonum polygonoides*, *Caroxylon imbricatum*, *Heliotropium crispum*, *Lasiurus scindicus*, *Saccharum munja*, *Acacia nilotica*, *Salvadora persica*, *Prosopis juliflora*, *Vachellia jacquemontii*, *Cynodon dactylon*, *Cenchrus ciliaris* and *Leptochloa fusca*) that have not been previously researched for their ethnopharmacological properties. Notably, quantitative analyses show that *Phoenix dactylifera* has the highest relative importance (RI = 1.05), highlighting its diverse therapeutic and nutritional value. In contrast, *Calotropis gigantea* has the highest relative frequency of citation (RFC = 0.86) and has the highest similarity index (SI = 1.0) for treating insect bites, indicating strong cultural consensus and cross-validation across different cultures. The reliance on oral and topical medicines derived from various plant components—such as pods, bark, leaves, fruits, latex, and whole plants—addresses a wide range of ailments, including diabetes, cancer, jaundice, digestive disorders, wound healing, and animal health issues. However, the study identifies a significant concern: traditional knowledge is primarily transmitted orally, with only 13 percent of respondents being over 60 years old and a notable gender disparity (98% male). This highlights the urgent risk of knowledge loss due to cultural decline and climate challenges. This research lays a scientific foundation for future pharmacological validation of new plant-derived therapies, emphasizing the need for community-engaged conservation strategies. It also advocates for the integration of this ethnomedicinal knowledge into primary healthcare systems to preserve cultural heritage and sustainably manage wild flora in the Cholistan Desert.

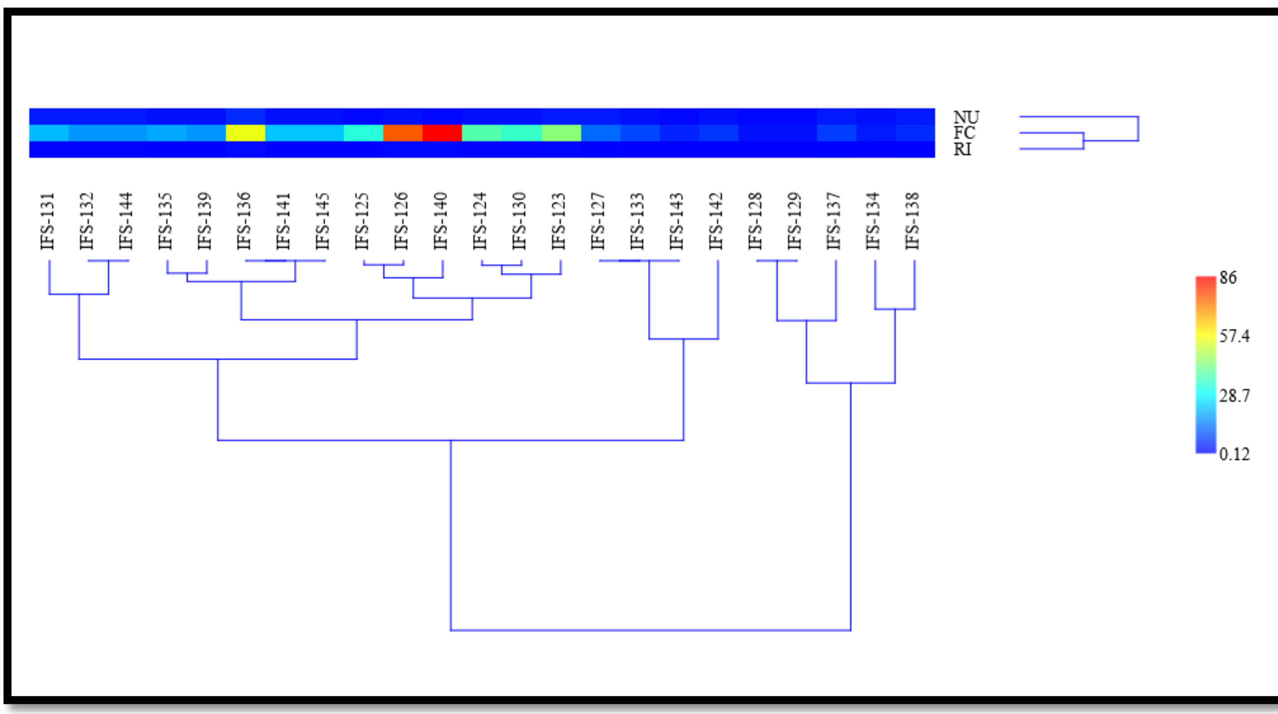

Figure 8: Cluster showing the NU (Number of diseases), FC (Frequency of citation) and RI (Relative importance) correlation.

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Table 2: Ethnopharmacological uses of wild plants in the study area.

Name	FC	REC	Product use	Mode of use	Diseases	NU	RNU	RI	Previous report	SI
Prosopis cineraria (L.) Druce Persian Mesquite	44	0.44	Leaf, pod	Topical	Muscle pain, wounds, skin infection	3	0.6	0.74	Liver, bladder, eye, skin and pancreatic problems, joint pain, ulcer (Malik et al., 2015; Umair et al., 2017; Umair et al., 2019; Saeed et al., 2022; Perveen et al., 2024), fever and cancer (Al Saidi et al., 2024; Awasthi et al., 2024; Kalaivani and Mathubala, 2024)	0.67
Tamarix aphylla (L.) H.Karst. Athel	38	0.38	Bark	Topical	Wound healing, skin infection	2	0.4	0.58	Wound, boils, cough, cold, sexual weakness, stomach and eye problems (Malik et al., 2015; Umair et al., 2017; Umair et al., 2019; Shah et al., 2021; Perveen et al., 2024; Umair et al., 2024) and fever (Altemani et al., 2024; Hamed et al., 2024)	0.5
Acacia nilotica (L.) Willd. ex Delile Gum Arabic Tree	33	0.33	leaf	Oral	Jaundice	1	0.2	0.43		0
Ziziphus mauritiana Lam. Indian Jujube	76	0.76	Leaf, fruit	Topical, oral	Skin infection, diabetes	2	0.4	0.96	Asthma, digestive, ulcers, toothache, diarrhea (Umair et al., 2017; Umair et al., 2019; Shah et al., 2021; Waheed et al., 2023) and diabetes (Ould Belle et al., 2024; Ralte and Singh, 2024; Yebouk et al., 2025)	0.5
Salvadora persica L. Toothbrush Tree	12	0.12	Twigs (miswak), bark	Oral	Oral health, teeth pain, gut health	3	0.6	0.42		0
Caroxylon imbricatum (Forssk.) Moq. Saltwort	2	0.02	Whole plant	Topical	Skin infection	1	0.2	0.12		0
Suaeda fruticosa Forssk. ex J.F.Gmel. Seepweed	2	0.02	Whole plant	Topical	Skin infection	1	0.2	0.12	Eye, stomach, kidney and liver problems, cancer and snake bites (Umair et al., 2019; Naz et al., 2022; Waheed et al., 2023)	0
Heliotropium crispum Desf.	35	0.35	Whole plant	Oral	Diabetes, cancer	2	0.4	0.55		0

Wild Heliotrope										
Prosopis juliflora (Sw.) DC. Mesquite	21	0.21	Leaf	Oral	Gut health, cancer, cough	3	0.6	0.51		0
Vachellia jacquemontii (Benth.) Ali Desert Thorn Acacia	17	0.17	Bark	Oral	Gastrointestinal issues, swelling, joint pain	3	0.6	0.47		0
Crotalaria burhia Buch.-Ham. ex Benth. Khimp	8	0.08	Root	Oral	Diabetes, indigestion	2	0.4	0.28	Skin problems, fever, pain, weakness, (Umair et al., 2019) and renal issues (Aslam et al., 2023)	0
Cynodon dactylon L. Bermuda grass	3	0.03	Whole plant	Topical	Wound healing, skin infection	2	0.4	0.23		0
Saccharum spontaneum L. Wild sugarcane	19	0.19	Root	Oral	Diabetes	2	0.4	0.39		0
Phoenix dactylifera L. Date palm	55	0.55	Fruit	Oral	Weakness, anemia, fatigue, malnutrition, gut health	5	1	1.05		0
Calligonum polygonoides L. Desert wire shrub	7	0.07	Root, stem	Oral	Diabetes, gut health, fever	3	0.6	0.37		0
Capparis decidua (Forssk.) Edgew. Desert caper	5	0.05	Bark	Oral, topical	Diabetes, gut health, skin infection	3	0.6	0.35	Diabetes, stomach, skin, lung and liver issues, anemia, impotency, fevers and pain (Umair et al., 2017; Naz et al., 2022; Saeed et al., 2022; Hussain and Altaf, 2023; Waheed et al., 2023; Umair et al., 2024)	0.67
Sporobolus ioclados (Nees ex Trin.) Nees Wild desert grass	17	0.17	Whole plant	Topical	Wound healing, skin infection	2	0.4	0.37		0
Calotropis gigantea (L.) W.T.Aiton Giant milkweed	86	0.86	Latex	Topical	Insect bite	1	0.2	0.96	Asthma, bites of insects and snake, pain, wounds and epilepsy (Gupta and Wagh, 2024; Kalita et al., 2024; Panaskar et al., 2024; Pandey et al., 2024)	1
Tamarix dioica Roxb. ex Roth Desert tamarisk	22	0.22	Bark	Oral	Diabetes, liver issues	2	0.4	0.42	Gut, Lung, spleen and liver problems (Naz et al., 2022; Gogoi et al., 2023)	0.5

Cenchrus ciliaris L. Desert fodder grass	6	0.06	Whole plant	Oral	Livestock health, milk production	2	0.4	0.26	0
Lasiurus scindicus Henrard Desert feather grass	4	0.04	Whole plant	Topical	Skin infection	1	0.2	0.14	0
Saccharum munja Roxb. Wild cane grass	17	0.17	Whole plant	Oral, topical	Diabetes, urinary disorders, wound healing	3	0.6	0.47	0
Leptochloa fusca (L.) Kunth Brown Beetle-grass	22	0.22	Whole plant	Oral	Diabetes, urinary disorders	2	0.4	0.42	0