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ETHNOBOTANICAL USES OF TRADITIONAL PLANTS FOR MEDICINAL, FOOD, COSMETIC, AND CULTURAL PURPOSES IN SIBI DIVISION, BALOCHISTAN, PAKISTAN

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Abstract

Indigenous communities have developed extensive knowledge of local plant resources through long-term interaction with their natural environment. This ethnobotanical knowledge contributes to traditional healthcare, food security, personal care, cultural practices, and household livelihoods. The present study investigated traditional plant utilization in Sibi Division, Balochistan, Pakistan, with particular emphasis on medicinal, nutritional, cosmetic/skin-beauty, cultural, and other practical applications. Field investigations were conducted from 2022 to 2023 in Sibi, Lehri, Haji Shaher, Methri, and surrounding rural communities. Ethnobotanical information was obtained through field observations, semi-structured questionnaires, individual interviews, group discussions, and participant observation involving traditional healers, herbalists, farmers, shepherds, elderly people, and women possessing knowledge of local plants. The informants ranged from 21 to 81 years of age. Plant specimens were collected, photographed, preserved as voucher specimens, and botanically identified with the assistance of taxonomic expertise and comparison with botanical resources. The study documented approximately 30 useful plant species representing diverse botanical families and a broad range of applications. Important medicinally used species included Azadirachta indica, Withania coagulans, Aloe barbadensis, Mentha royleana,

Calotropis procera, Acacia nilotica, Withania somnifera, Solanum surattense, and other locally recognized medicinal plants. Several species were also used as food resources, including Vigna radiata, Sorghum bicolor, Ziziphus nummularia, Amaranthus hybridus, Chenopodium album, Capparis decidua, Portulaca oleracea, and Phoenix dactylifera. Plants such as Azadirachta indica and Aloe barbadensis were particularly associated with skin and personal-care applications. The findings demonstrate that local plant resources have multifunctional importance and form an important component of indigenous livelihoods and healthcare practices. At the same time, environmental degradation, overgrazing, deforestation, climate stress, changing lifestyles, migration, and declining intergenerational transmission threaten both plant resources and associated knowledge. Systematic documentation, conservation, sustainable harvesting, scientific validation, and ethically appropriate development of plant-based products could help preserve this biocultural heritage and provide a basis for future pharmacological, nutraceutical, and cosmeceutical research.

1. Introduction

Plants have been closely associated with human survival and cultural development throughout history. Indigenous communities have traditionally relied on plants for food, medicine, shelter, personal care, livestock management, and cultural practices. Ethnobotany provides a scientific framework for understanding these relationships between people and plants and for documenting how biological resources are selected, managed, prepared, and used within particular cultural settings (Cotton, 1996). Ethnobotanical research can therefore contribute not only to the documentation of cultural knowledge but also to biodiversity conservation and the investigation of potentially useful natural products.

Traditional knowledge is particularly important in rural regions where access to formal healthcare and commercial products may be limited. In Pakistan, medicinal plants continue to have an important role in household healthcare and traditional medical systems. Previous ethnobotanical studies in Pakistan have documented extensive indigenous knowledge concerning plant identification, preparation, administration, and therapeutic applications (Alam et al., 2011; Shinwari, 2010). Studies in different Pakistani regions have also demonstrated that indigenous communities use plants for multiple purposes, including medicine, food, fodder, fuel, construction, religious practices, and other household needs.

Balochistan represents an important region for ethnobotanical research because of its extensive geographical area and ecological diversity. The province includes arid and semi-arid plains, deserts, mountains, riverine habitats, and coastal environments. Such environmental heterogeneity supports plant communities adapted to water scarcity, high temperatures, salinity, and other environmental stresses. Local communities have consequently developed knowledge regarding plants that can provide food, medicine, cosmetics, fodder, fuel, and other resources under challenging environmental conditions.

The relationship between biological diversity and traditional knowledge is particularly important in areas where knowledge is transmitted orally. Previous research has shown that traditional plant knowledge may be concentrated among older members of communities and may decline when younger generations become less involved in traditional practices. In Pakistan, ethnobotanical research has repeatedly emphasized the need to document indigenous plant knowledge before it is lost through socioeconomic and environmental changes (Alam et al., 2011; Shinwari & Qaiser, 2011).

Wild and semi-wild edible plants also have nutritional and cultural significance. Ethnobotanical knowledge can contribute to food resilience because communities may draw on locally available plants during periods of limited agricultural production or economic difficulty. Quave and Pieroni (2015), for example, demonstrated that culturally transmitted ethnobotanical knowledge can contribute to both food security and health strategies.

Plant resources also have an important place in traditional skin and personal-care practices. Species used for topical preparations, cleansing, wound care, hair care, and cosmetic purposes may represent potential sources of bioactive compounds for future research. However, traditional use should not automatically be interpreted as proof of clinical efficacy or safety. Scientific investigation, toxicological assessment, phytochemical characterization, and appropriate clinical evaluation are necessary before traditional applications can be translated into validated therapeutic or commercial products.

The present study was therefore designed to document traditional plant utilization in selected communities of Sibi Division, Balochistan, with particular attention to medicinal, food, skin-beauty, cultural, and other practical uses. The study also considers the potential significance of these resources for biodiversity conservation, sustainable livelihoods, and future scientific investigation.

2. Materials and Methods

2.1 Study Area

The study was conducted in Sibi Division, Balochistan, Pakistan, particularly in Lehri, Haji Shaher, Methri, Sibi and surrounding rural communities. The region is characterized by dry to semi-arid environmental conditions, seasonal water availability, rocky areas, agricultural lands and natural vegetation.

Local communities possess knowledge concerning the collection and utilization of plants for medicine, food, personal care and household purposes. The study area was selected because of the presence of traditional knowledge holders and the reported diversity of useful plants.

Ethnobotanical research in Pakistan has demonstrated that local ecological conditions strongly influence plant utilization patterns (Ajaib et al., 2010; Haq et al., 2011; Razzaq et al., 2013). Similar relationships between environmental resources and indigenous knowledge have been documented in other regions (Kindie et al., 2021; Nadembega et al., 2011).

2.2 Field Survey

Field surveys were conducted between September 2022 and December 2023. Information was collected during different seasons from villages, agricultural fields, gardens, grazing areas, markets and other locations where local people interacted with plant resources.

The methodological approach followed established ethnobotanical principles described by Cotton (1996) and the field-oriented approach of Martin (1995). The investigation included semi-structured interviews, structured questionnaires, direct observation, group discussions and participant observation.

Ethnobotanical investigations based on interviews and community participation have been successfully applied in Pakistan and elsewhere (Aziz et al., 2016; Kadir et al., 2014; Rehecho et al., 2011).

2.3 Selection of Informants

Six principal informants were selected from each study location. Informants included traditional healers, herbalists, farmers, shepherds, elderly residents, women and other community members possessing knowledge of local plants.

The age range of informants was approximately 21–81 years. Repeated visits were made to knowledgeable individuals to verify information concerning plant identity, plant parts used and traditional applications.

The importance of experienced local informants has been emphasized in ethnobotanical studies because much traditional knowledge is transmitted orally through families and community networks (d'Avigdor et al., 2014; Torres-Avilez et al., 2016).

2.4 Data Collection

Information recorded during interviews included:

- local/common name;
- botanical name;
- plant family;
- plant part used;
- preparation method;
- traditional medicinal application;
- food application;
- cosmetic/skin-care application;

- method of administration;
- cultural importance; and
- other household uses.

The information was cross-checked through repeated interviews and direct observation.

2.5 Plant Collection and Identification

Plant specimens were collected during field visits using plant bags, knives, cutters, digging tools, field notebooks, questionnaires, cameras and GPS equipment. Representative specimens were pressed, dried and mounted on herbarium sheets.

The thesis reports that specimens were identified by a taxonomist and compared with available botanical resources. Voucher specimens were preserved for future reference. Standard herbarium procedures are important for maintaining reliable taxonomic identification and documentation (Bekele Kindie et al., 2021; Ali et al., 2017).

3. Results

3.1 Diversity of Documented Plant Resources

The study documented approximately **30 plant species** used by local communities for medicinal, nutritional, cosmetic, cultural, and other practical purposes. The plants represented several botanical families, including Apocynaceae, Meliaceae, Lamiaceae, Solanaceae, Fabaceae, Asphodelaceae, Caryophyllaceae, Amaranthaceae, Rhamnaceae, Salvadoraceae, Tamaricaceae, Arecaceae, Cucurbitaceae, Portulacaceae, and Rosaceae.

The diversity of plant uses demonstrates that ethnobotanical resources in the study region are multifunctional rather than restricted to traditional medicine.

Table 1. Selected ethnobotanically important plants documented in the study

No.	Scientific name	Local/common name	Family	Part used	Principal reported use
1	*Calotropis procera*	Aak	Apocynaceae	Leaves	Medicinal
2	*Azadirachta indica*	Neem	Meliaceae	Leaves	Medicinal; skin/cosmetic

3	*Thymus serpyllum*	Kandero	Lamiaceae	Flowers	Medicinal
4	*Withania coagulans*	Panir	Solanaceae	Berries	Medicinal; dairy-related use
5	*Acacia nilotica*	Kika	Fabaceae	Fruit	Medicinal
6	*Aloe barbadensis*	Aloe vera	Asphodelaceae	Whole plant/gel	Skin beauty; medicinal
7	*Herniaria hirsute*	Hairy rupturewort	Caryophyllacea e	Whole plant	Medicinal
8	*Digera muricata*	Lulur	Amaranthaceae	Leaves	Food; medicinal
9	*Suaeda fruticosa*	Shrubby seablite/Larren	Amaranthaceae	Whole plant	Traditional household/moder n applications
10	*Vigna radiata*	Mung bean	Fabaceae	Seeds	Food; protein source
11	*Sorghum bicolor*	Jawar	Poaceae	Grain/leaves	Food; livestock feed
12	*Ziziphus nummularia*	Ber	Rhamnaceae	Fruit	Food; medicinal/fodder
13	*Salvadora persica*	Peelu	Salvadoraceae	Fruit/twigs	Food; oral care
14	*Tamarix dioica*	Ghaz	Tamaricaceae	Leaves	Medicinal
15	*Withania somnifera*	Ashwagandha	Solanaceae	Roots/leaves/frui t	Medicinal
16	*Mentha royleana*	Pudina	Lamiaceae	Leaves	Medicinal; digestive use

17	*Amaranthus hybridus*	Lal saag	Amaranthaceae	Leaves	Food
18	*Chenopodium album*	Bathua	Amaranthaceae	Leaves	Food; medicinal
19	*Capparis decidua*	Karir	Capparaceae	Fruit/leaves	Food; medicinal
20	*Portulaca oleracea*	Purslane	Portulacaceae	Leaves/stems	Food; medicinal
21	*Prunus brahuica*	Mashmonk gum	Rosaceae	Plant	Medicinal
22	*Phoenix dactylifera*	Khajoor	Arecaceae	Fruit	Food
23	*Citrullus colocynthis*	Bitter apple	Cucurbitaceae	Fruit	Traditional food/medicinal use
24	*Solanum surattense*	Kantakari	Solanaceae	Whole plant	Medicinal

Note: The table summarizes species explicitly documented in the accessible Results section of the thesis. The thesis indicates that approximately 30 species were documented; the complete original species list should be retained as a supplementary table in the final manuscript.

The original study records the use of *Calotropis procera* leaves for traditional medicinal purposes, while *Azadirachta indica* was particularly associated with medicinal and skin/cosmetic applications.

3.2 Medicinal Plant Uses

Medicinal applications represented an important component of local plant knowledge. The documented plants were traditionally associated with a broad range of health concerns, including digestive disorders, respiratory complaints, skin problems, wounds, fever, liver-related problems, kidney stones, pain, and other common ailments.

For example, *Calotropis procera* was reported as a medicinal plant whose leaves have traditionally been used for skin, stomach, and diarrheal problems. *Withania coagulans* was documented for traditional medicinal use, while its fruits were also associated with milk coagulation and

preparation of paneer. *Acacia nilotica* was reported to have medicinal applications involving different plant parts.

Herniaria hirsuta was reported in traditional herbal practice for urinary health and kidney-stone-related applications. *Mentha royleana* was used as a tea or decoction for digestive complaints, vomiting, abdominal discomfort, and related conditions. *Solanum surattense* was traditionally used for respiratory complaints including cough and asthma.

These observations are consistent with the broader ethnobotanical literature from Pakistan, where communities use diverse wild plants for gastrointestinal, respiratory, dermatological, urinary, hepatic, and other health-related conditions (Alam et al., 2011; Shinwari, 2010).

Withania coagulans

Common Name: Panir

Family Name: Solanaceae

Part use: Berries

Temperature: We noted 35C

prepose of use: Medicinal

Description: This is a useful plant for both medicinal plants and nearby farming populations. Withania coagulans is a little medicinal plant that grows in nice, climates with little rainfall The plant is frequently utilized in conventional treatments for a number of therapeutic purposes. It has small yellow blossoms and spherical fruit with a papery coating. Withania, which is coagulans may grow on dry soil and using little water. On occasions, dairy products like cheese are made from its fruits. Withania coagulans fruits, root, or powdered is commonly used orally as a decoction, powdered form, infusion, or putty mixed with milk and water in conventional medicine. The fruits and leaves of the plant are prized for their medicinal qualities. In addition, some local practices employ crushed fruit for coagulation milk (create paneer).





3.3 Food and Nutritional Uses

Several documented species were used directly as food resources. These included *Vigna radiata*, *Sorghum bicolor*, *Ziziphus nummularia*, *Amaranthus hybridus*, *Chenopodium album*, *Capparis decidua*, *Portulaca oleracea*, and *Phoenix dactylifera*.

Vigna radiata was reported as an important protein-containing food crop consumed as cooked seeds, sprouts, soups, curries, salads, and flour. *Sorghum bicolor* was associated with bread, flour, porridge, grain, and animal feed.

The fruits of *Ziziphus nummularia* were consumed by people and animals, while *Amaranthus hybridus* and *Chenopodium album* were consumed as leafy vegetables. *Portulaca oleracea* was consumed raw or cooked as a vegetable, including in salads, soups, and traditional saag. *Phoenix dactylifera* provided edible dates and was associated with nutritional and economic value.

These findings demonstrate the importance of plant diversity for dietary diversity and local food systems.

Zizphus nummularia

Common Name: Ber

Family Name: Rhamnaceae

Part use: Fruit

Temperature: 35C

Purpose of use: Fruit edible (Food)

Description: In arid or desert areas of the Near East and the region, the thorny plant Ziziphus nummularia is abundantly found. It also contains stinging spikes and tiny, spherical leaves. Ziziphus nummularia is often employed as fodder since its leaves nourish animals in desert regions. It also helps to prevent erosion of soil and improves ground resilience in arid areas. Both people and animals utilize the plant's little edible fruit. Fresh fruits; concoctions created from bark, roots, or leaves that are usually used as decoctions or pastes; and leaves that are additionally fed. Ziziphus nummularia is valued for its agronomic, sustainable, and medicinal properties in arid environments. It grows well in hot, arid climates and belongs to the Rhamnaceae group.





3.4 Skin-Beauty and Personal-Care Uses

Traditional plant-based personal-care practices were also documented. *Azadirachta indica* was reported as a medicinal and cosmetic resource, while *Aloe barbadensis* was particularly associated with skin-care applications.

The thesis describes *Aloe barbadensis* as a plant used in pharmaceutical, cosmetic, and wellness contexts, with the gel traditionally applied to skin and hair and used for cuts, wounds, and irritation. The use of *Azadirachta indica* in traditional skin and hair practices is also consistent with its extensive ethnomedicinal history. However, traditional cosmetic use should be differentiated from scientifically demonstrated efficacy, and further phytochemical, dermatological, toxicological, and clinical investigations are required before specific therapeutic claims can be established.

Aloe barbadensis

Common Name: Aloe vera

Family Name: Asphodelaceae

Part use: Whole plant

Temperature: We noted 27C

prepose of use**:** Skin beauty

Description: This plant can be utilized for pharmaceuticals, cosmetics, and wellness items due to its curative properties. Around the globe, Aloe barbadensis is highly valued for its nutritional, medicinal, and cosmetic qualities. It is consumed orally as a water, gel, or extraction and applied locally as a fresh solution on the layers of skin or hair for conventional medicine. Its big, meaty fresh foliage are packed with a clear gel that has several health advantages. Aloe vera, also known as Cane barbadensis, is a medicinal plant that is usually grown in warm climates. Cuts, injuries, and skin irritation are frequently addressed using aloe barbadensis gel. The aloe barb thrives well in desert areas and requires little water to live.







3.5 Multifunctional Plant Use

An important finding of the study was the multifunctional nature of several species. Plants were not necessarily restricted to a single category. A species could simultaneously serve as food, medicine, fodder, oral-care material, cosmetic resource, fuelwood, or environmental resource.

For example, *Salvadora persica* was associated with edible fruit and traditional oral hygiene, while *Ziziphus nummularia* provided food and fodder and contributed to soil stabilization in dry environments. *Withania coagulans* was associated with medicinal use as well as milk coagulation. These multifunctional roles illustrate how local communities maximize available biological resources.

Salvadora persica

Common Name**:** Peelu

Family Name: Salvadoraceae

Part use: Fruit

Temperature: 35C

Purpose of use: Fruit edible (Food)

Administration: Orally fruit eaten, it belongs to the Salvadoraceae group and thrives in hot, salty environments. Salvadora persica is known as the brush tree since its twigs are used as organic gnawing on sticks to clean mouths. The shrub yields tiny plants, green foliage, and excellent fruits. Salvadora persica is highly valued for its medicinal properties, environmental tolerance, as well as significance for dentistry. It is also used in conventional medicine to treat minor illnesses and provide tooth care. Usually found in dry, desert, and coastal regions, Salvadora persica is a small tree or shrub.





4. Discussion

The present study demonstrates the continuing importance of traditional botanical knowledge among communities in Sibi Division. The documentation of approximately 30 useful plant species indicates that local plant knowledge extends beyond medicinal applications to include food, cosmetics and household resources.

The medicinal use of plants documented in the study is consistent with earlier ethnobotanical investigations conducted in Pakistan. Aziz et al. (2016) documented extensive medicinal plant use among indigenous communities of South Waziristan, while Alam et al. (2011) reported traditional medicinal knowledge in Chagharzai Valley. Sher et al. (2015) similarly documented traditional folk medicines among tribal communities in Khyber Pakhtunkhwa.

Research from Balochistan is particularly relevant to the present findings. Tareen et al. (2010) documented indigenous folk medicine among women in Kalat and Khuzdar, demonstrating the importance of local knowledge holders in maintaining ethnomedicinal traditions. Qasim et al. (2010) likewise reported ethnobotanical applications of halophytes in Hub, Balochistan.

The food plants documented in the present study demonstrate the importance of wild and semi-wild resources to local diets. Wild foods can contribute to food security, dietary diversity and cultural identity, particularly in environments where cultivated food availability may be seasonally restricted (Bharucha & Pretty, 2010; Quave & Pieroni, 2015). Traditional wild vegetables in Kurram District provide another example of how plant resources contribute to local diets in Pakistan (Abbas et al., 2020).

Traditional knowledge is also socially distributed. Women, elders, farmers and traditional healers frequently serve as important knowledge holders. Torres-Avilez et al. (2016) demonstrated the importance of gender in medicinal plant knowledge, while d'Avigdor et al. (2014) highlighted the importance of knowledge transmission between generations.

The study also highlights the potential relevance of medicinal plants to pharmacological and natural-product research. Medicinal plants have historically contributed compounds and chemical leads for drug discovery, and systematic investigation of traditional plant use can help identify candidates for future phytochemical research (Balunas & Kinghorn, 2005; Rasool Hassan, 2012; Lambert et al., 1997).

At the same time, traditional use should be distinguished from scientifically established therapeutic efficacy. Ethnobotanical documentation provides evidence that a plant is culturally used for a particular purpose; it does not itself establish safety, dosage, mechanism of action or clinical effectiveness.

The conservation dimension is equally important. Unsustainable harvesting, habitat degradation, agricultural expansion, overgrazing and socioeconomic changes can threaten medicinal plants and the knowledge associated with them. Shinwari and Qaiser (2011) emphasized sustainable harvesting and conservation of medicinal plants in Pakistan. Similar conservation concerns have been documented in ethnobotanical research from Pakistan and other regions (Kindie et al., 2021; Waheed et al., 2023; Hussain et al., 2023).

The potential loss of indigenous knowledge is also associated with modernization and migration. When knowledge is primarily transmitted orally, reduced interaction between younger generations and traditional knowledge holders can result in knowledge erosion. This issue has been documented in studies of traditional medicine in Ethiopia and other regions (d'Avigdor et al., 2014).

The present study therefore supports the need for integrated approaches combining ethnobotanical documentation, taxonomic verification, phytochemical analysis, pharmacological screening, nutritional evaluation and conservation planning.

5. Conclusion

The present ethnobotanical investigation demonstrates the considerable importance of local plant resources to indigenous and rural communities of Sibi Division, Balochistan. The study documented approximately 30 plant species used for medicinal, nutritional, cosmetic, cultural,

livestock, and other practical purposes. Medicinally important plants included *Azadirachta indica*, *Withania coagulans*, *Aloe barbadensis*, *Mentha royleana*, *Calotropis procera*, *Acacia nilotica*, *Withania somnifera*, and *Solanum surattense*, while several plants such as *Ziziphus nummularia*, *Amaranthus hybridus*, *Chenopodium album*, *Portulaca oleracea*, *Vigna radiata*, *Sorghum bicolor*, and *Phoenix dactylifera* contributed to traditional food systems.

The findings indicate that plant resources have multifunctional roles in local communities and represent an important component of cultural heritage and rural livelihood systems. The study also highlights the vulnerability of traditional knowledge and biological resources to environmental degradation, overexploitation, climate stress, changing lifestyles, migration, and declining intergenerational transmission.

Systematic ethnobotanical documentation should therefore be accompanied by conservation programs, sustainable harvesting, cultivation of valuable species, community awareness, and transmission of indigenous knowledge to younger generations. At the same time, scientifically selected plants should be subjected to phytochemical, pharmacological, nutritional, toxicological, and dermatological investigation before claims concerning therapeutic or commercial applications are made.

The documented plant resources provide a valuable foundation for future research in ethnopharmacology, nutraceuticals, herbal cosmetics, natural products, biodiversity conservation, and sustainable rural development. The integration of indigenous knowledge with rigorous scientific validation can help preserve both biological diversity and the cultural knowledge associated with it.

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