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Ethnobotanical Survey of Traditional Medicinal Plants in Shekhawati Region, Rajasthan, India

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Abstract:

This ethnobotanical study explores the traditional medicinal practices in the Shekhawati region of Rajasthan, India. It highlights the utilization of various plant species by local communities for disease treatment, sacred rituals and magico-religious beliefs. The study underlines the importance of preserving this ethnomedicinal knowledge and integrating it with modern medicine. It also emphasizes the significance of sustainable practices and biodiversity conservation. The findings shed light on the profound connection between people, plants and the environment, offering insights into traditional and modern healthcare approaches.

Keywords: Ethnobotany, Traditional Medicine, Ethnomedicinal Plants, Rajasthan, Biodiversity Conservation

Introduction:

India has a rich heritage of traditional medicine practices, deeply ingrained in its rural and tribal communities. This folklore medicine dates back to the pre-Vedic era and even the Mohenjo-Daro and Harrapan civilizations (Sharma, 2006). The use of plants for producing medicines, essential oils and insecticides has a long history, dating back to the early days of civilization and indigenous health practices related to human health are referred to as ethnomedicine (Ramawat *et al.*, 2009). Vegetation diversity plays a vital role in maintaining ecological balance in any natural ecosystem. Therefore, ecological studies and systematic floristic inventory must be carried out on regular interval to assess changes in diversity due to natural as well as anthropogenic factors (Joshi, 1991).

The main traditional systems of medicine in India include Ayurveda, Unani and Siddha, which use over 7,500 plant species. Traditional healers play a significant role in providing information about the use of plants or plant parts as medicine and the World Health Organization, (2002) has estimated that 80% of the population in developing countries relies on traditional herbal medicines for primary healthcare due to their affordability and safety compared to synthetic drugs. Ethnobotany, the study of people-plant relationships, has evolved into a multidisciplinary field including ecology, economic botany, pharmacology and public health (Chaudhary and Sharma, 2019). Herbal medicines are considered important in primary healthcare for individuals and communities in many developing countries (Sheldon *et al.*, 1997) and plant-based traditional knowledge has become a valuable tool in the search for new sources of drugs and nutraceuticals (Ghosh, 2008; Sharma and Mujumdar, 2003).

Over the last 30 years, there has been a significant amount of work on ethnobotanical plants, particularly in the state of Rajasthan. A number of notable contributions have been made and these studies

have helped to expand our understanding of the relationship between people, plants and the environment (Anita et al., 2007; Asawa, 1995; Billore et al., 1991; Gautam and Sharma, 2014; Guria, 2000; Jain et al., 2004; Jain et al., 2009; Joshi and Awasthi, 1992; Joshi, 1981; Joshi and Awasthi, 1991; 1995; Katewa et al., 2004; Katewa and Guria, 1997; Mishra et al., 1991; Sharma and Sharma, 1989; Sharma and Khandelwal, 2010; Sharma, 2002; Singh, 1998; Singh and Pandey, 1983, 1996; Trivedi, 2002; Trivedi and Nargas, 2000).

Information and documentation of various trends and methods of ethnobotanical use was obtained from the local people (Negi et al., 2012; Trivedi, 2006, 2009). The social customs and mythological rituals of the rural people living in the area will be studied. The socio-religious rituals and ceremonies of the indigenous people play an important role in the conservation of plant diversity that is also an important aspect of study (Dubey et al., 2012; Jain, 2016; Pareek et al., n.d.). The first categories of practitioners are usually professionals and are referred in our society as the 'vaidyas', 'hakims' and 'homeopaths'. The second category of practitioners in traditional medicine are called as 'folk healers' or 'folk practitioners (Siddiqui et al., 1989; Siddiqui & Swapnal, 2009). The village elders who have knowledge about medicinal herbs also perform the function of a folk healer (Khan & Singh, 2010, 2012). The necessary information is gathered from all of them and properly documented.

The present study aims to fill the gap in the knowledge of ethnobotany in the Shekhawati region. The objective of this investigation is to document the plant species utilized by the tribal and rural people in the area for various purposes, including treatment of diseases, sacred groves and places of worship and magico-religious beliefs.

Materials and Methods:

Study area:

The Shekhawati region is located in the North-East part of the Indian state of Rajasthan and is situated within the Thar desert. It is located between 27^{O} 24' to 29^{O} 02' N Latitude and 73^{O} 04' to 76^{O} 05' E Longitude, at an elevation of approximately 320 meters above sea level. The study area Fatehpur and Ramgarh are towns situated in the Sikar district of the Indian state of Rajasthan.

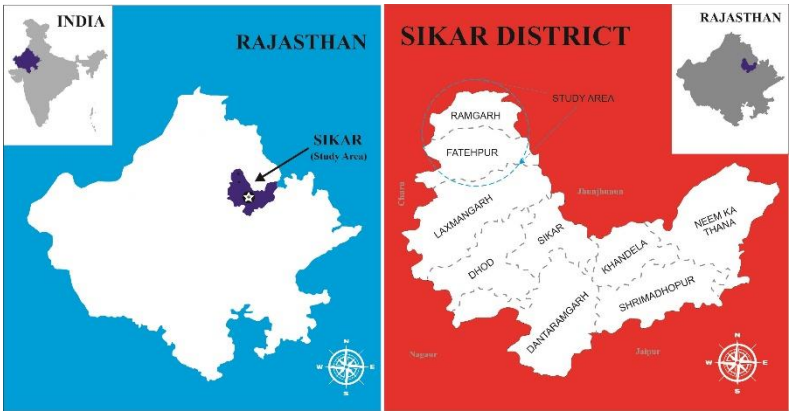

Figure 1. Maps indicating the geographical location of the study area in Rajasthan and its placement within the broader context of India.

The study area experiences an average annual rainfall of 463.0 mm between 1971 and 2011, while the normal rainfall during the period from 1901 to 1970 was slightly lower at 459.8 mm. The majority of the annual rainfall, around 95%, occurs during the southwest monsoon season, which typically begins in

the last week of June and ends in mid-September. Neem Ka Thana, situated in the southeastern part of the district, receives the highest mean annual rainfall of 536.6 mm. On the other hand, Fatehpur, located near the northwestern boundary of the district, records the lowest mean annual rainfall of 407.8 mm. The climate in the Sikar district is generally arid, with the exception of the monsoon period. August experiences the highest humidity levels in the district, with an average daily relative humidity of 80%.

Data collection:

In the course of data collection for this study, field trips were organized, involving visits to the remote areas of Fatehpur and Ramgarh, located in the Sikar district of Rajasthan. The local residents and traditional healers, known as Vaidya, played a crucial role in guiding and facilitating these field excursions. The rural regions were explored and in-depth discussions were held with the traditional healers to gain insights into the healing properties of specific plant species. It is worth noting that while existing literature primarily highlighted the usage of specific parts of certain plant species, the traditional healers provided valuable information regarding the medicinal applications of other plant parts, which had not been documented in prior publications. The practitioners of traditional medicine in this region fall into two distinct categories.

The first category comprises individuals who possess foundational knowledge of medicinal plants based on their social upbringing and traditional practices. The second category includes those who have pursued formal education, holding graduate and master's degrees in Ayurvedic medicine. Within this community, there exist both 'Vaidya' and 'Hakims' who have acquired substantial knowledge of medicinal plants and frequently prescribe remedies based on their traditional and ancestral wisdom rooted in Ayurvedic medicine. Furthermore, the study involved interactions with local villagers and rural inhabitants, primarily consisting of elder men and women who have accumulated substantial knowledge of the indigenous medicinal plants in their vicinity. It is noteworthy that, during the field surveys, discussions were also conducted with younger members of the community who demonstrated a commendable understanding of the usage of medicinal plants within their local context.

Results and Discussion:

The results presented in this study offer a comprehensive account of the plant species found in the Fatehpur and Ramgarh areas of Sikar district, Rajasthan, which are employed by the local population for ethnomedicinal purposes. These findings are instrumental in shedding light on the traditional healthcare practices of the region and the therapeutic potential of these plants. The discussion below provides an analysis of the ethnomedicinal plant species and their applications for addressing various health issues:

1. Preserving Traditional Knowledge: The study underscores the invaluable repository of traditional knowledge present among the local inhabitants. These plants, such as *Aloe vera* for burns and wounds, *Asparagus racemosus* for colic and rheumatoid arthritis and *Calotropis procera* for its analgesic and anti-inflammatory properties, reflect the profound understanding of the therapeutic properties of these plants.

Figure 2. A. *Calligonum polygonoides* (Seeds), B. *Capparis decidua* (Fruits), C. and D. *Prosopis cineraria* (Fruits- Dry and Green), E. *Solanum indicum* (Fruits), F. *Pedalium murex* (Fruits), G. *Abrus precatorius* (Seeds), H. *Withania somenifera* (Roots), I. *Momordica dioca* (Fruits) and J. *Momordica balsemina* (Fruits)

2. Multifaceted Applications: The table highlights the diverse applications of these ethnomedicinal plant species. They are harnessed to treat an array of health concerns, encompassing respiratory disorders, gastrointestinal maladies, dermatological conditions and reproductive health. Notable examples include *Cleome viscosa* seeds for bleeding piles, *Ephedra foliata* stems for respiratory ailments and Momordica dioica tuberous roots as astringents and antiseptics.

3. Cultural and Medicinal Fusion: Several of the plants, including Ficus religiosa, serve not only medicinal but also cultural and religious roles in the local community. They are employed in religious rituals, emphasizing the interconnectedness of cultural beliefs and medicinal practices in the region.

4. Safety and Efficacy: The ethnomedicinal practitioners and local populace have cultivated a deep understanding of the safety and efficacy of these plant-based remedies over generations. This knowledge continues to be a trusted source of healthcare for a substantial portion of the region's inhabitants.

5. Bioactive Compounds: Recognizing the presence of bioactive compounds within these plants is of paramount importance for contemporary pharmacological research. The table references significant compounds such as Withaferin A in *Withania somnifera* and sesquiterpene lactones in *Xanthium strumarium*, which have demonstrated a spectrum of medicinal properties and present opportunities for pharmaceutical exploration.

6. Conservation and Sustainable Practices: The ethnomedicinal utilization of these plant species emphasizes the need for biodiversity preservation. Many of these plants are indigenous to the region and play vital ecological roles. Employing sustainable harvesting and cultivation practices can ensure the availability of these plants for future generations.

7. Integration with Modern Medicine: The region's ongoing development presents an opportunity for the harmonious integration of traditional knowledge with modern medical practices. This convergence has the potential to foster the development of innovative pharmaceuticals and healthcare approaches.

Collaborative initiatives involving traditional healers and modern healthcare practitioners can serve as a bridge between these two paradigms.

Table 1. Ethnomedicinal Plant species reported in the study area

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
1	*Acacia nilotica*	Mimosaceae	Babul	Bark and leaf	Used for treating diarrhea, dysentery, wounds, skin infections and throat ailments with the gum obtained from the tree.
2	*Abutilon indicum*	Malvaceae	Kanghi	Leaves, flower, root	Leaves used for coughs, colds and respiratory congestion. Root extract used for urinary tract infections.
3	*Achyranthes aspera*	Amaranthaceae	Undo Kanto	Leaves, stems, roots, seeds	Used for digestive issues, pain, swelling and rheumatic conditions.
4	*Aloe vera*	Liliaceae	Gwrarpatha	Fleshy leaves	Applied for skin conditions like burns, wounds, sunburns and consumed for digestive benefits.
5	*Alysicarpus monilifer*	Fabaceae	Leel	Leaves, stems, seeds	Used for respiratory disorders, digestive issues and diuretic properties.
6	*Azardirachta indica*	Meliaceae	Neem	Leaves, bark, seeds	Utilized for its antimicrobial properties in remedies for skin conditions.
7	*Abrus precatorius*	Fabaceae	Chirmi	Seed	Used in small quantities as an abortifacient and

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
					sedative and for urinary issues.
8	*Adhatoda zeylanica*	Acanthaceae	Ardusa	Leaves	Used for respiratory issues like cough, cold, headache and bodyache.
9	*Aerva lanata*	Amaranthaceae	Kali-Bui	Root	Utilized for liver congestion, jaundice, pneumonia and typhoid in traditional medicine.
10	*Amaranthus spinosus*	Acanthaceae	Chaulai	Leaves	Used to address constipation and loss of appetite in traditional cuisine.
11	*Asparagus racemosus*	Asparagaceae	Satawari	Root, Tubers	Widely used for various health issues including colic, dysentery, acidity and rheumatoid arthritis.
12	*Asphodelus tenuifolius*	Liliaceae	Piazi	Leaves	Employed in the treatment of toxemia, kidney stones and swellings.
13	*Barleria prionitis*	Acanthaceae	Bajradanti	Plant, Leaves	Used to alleviate toothache, pyorrhea and prevent pus formation in the ears.
14	*Blepharis sindica*	Asteraceae	Bhangari, Bilikhoj	Seeds	Used as an invigorating tonic and for addressing urinary discharges.
15	*Boerhavia diffusa*	Nyctaginaceae	Sata	Root	Used for various medicinal properties, including managing renal diseases, nephrotic syndrome and more.

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
16	*Bauhinia racemosa*	Fabaceae	Jhinjha	Leaves	Employed for wound healing, treating cuts, bruises and skin infections.
17	*Calotropis procera*	Asclepiadaceae	Aak	Latex, flower	Used as an insecticide, analgesic and anti-inflammatory, with cultural and religious significance.
18	*Capparis aphylla*	Capparidaceae	Kair	Fruits, seeds	Known for anti-inflammatory properties, treating urinary discharges, dysentery and more.
19	*Caesalpinia pulcherrima*	Caesalpiniaceae	Krishnachuudaa	Leaves, Flowers, Root	Used for various medicinal purposes, including laxative, antipyretic, anthelmintic and more.
20	*Calligonum polygonoides*	Polygonaceae	Phog	Flowers	Used for stomach disorders, toothaches, cough, cold, asthma and for healing dog bites and stings.
21	*Chenopodium album*	Chenopodiaceae	Chilva	Leaves	Cooked as a vegetable to address urinary troubles and colic. Leaf extract administered orally for treating piles, cough and worms.
22	*Citrullus colocynthis*	Cucurbitaceae	Gar-tumba	Fruits	Dried fruit powder mixed with salt for treating constipation. Roasted fruits used

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
					for digestive disorders in animals.
23	*Celosia argentia*	Amaranthaceae	Makhmal	Flowers and Seeds	Flowers for menorrhagia and blood dysentery. Seeds for antidiarrheal properties and stomatitis. Whole plant for antibacterial and antiscorbutic effects.
24	*Clerodendrum phlomidis*	Verbenaceae	Irna	Root and Leaves	Root for antiasthmatic, antihistaminic, antispasmodic, antitussive, carminative and febrifuge properties. Leaves for febrifuge effects. Used in Ayurvedic medicine for cough, bronchitis, dyspnoea, chest diseases and sinusitis.
25	*Cleome gynandra*	Capparidaceae	Karalia	Green leaves, Leaf extract	Green leaves for addressing skin diseases. Leaf extract for curing earache.
26	*Cleome viscosa*	Cleomaceae	Singali	Seed	Seed powder taken orally to cure bleeding piles (hemorrhoids).
27	*Cocculus pendulus*	Menispermaceae	Pilwani	Leaf and Root	Leaf and root extract used in the treatment of skin diseases.

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
28	*Croton bonplandianum*	Euphorbiaceae	Kala-Bhangra	Seed, Bark and Roots	Bark and roots for cholagogue and purgative qualities. Leaves to staunch bleeding from cuts and wounds, address cholera and treat venereal sores. Seeds for internal abscesses, liver disorders, acute constipation and abdominal dropsy. Fresh juice for headaches. Roots and leaves for combating snake venom and alleviating high fevers.
29	*Echinops echinatus*	Asteraceae	Unt-kantalo	Aerial parts	Aerial parts contain alkaloids. Taraxasterol acetate for anti-inflammatory properties. Apigenin and derivatives for antifungal activity.
30	*Ephedra foliata*	Gnetaceae	Unt-phog	Stems and leaves	Stems for traditional remedies for respiratory conditions like asthma, bronchitis and congestion. Possible diuretic and anti-inflammatory properties.
31	*Euphorbia hirta*	Euphorbiaceae	Dudhi	Latex, Root, Leaves	Latex for warts and skin diseases. Root paste with honey for nursing mothers.

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
					Leaf decoction for asthma, cough, bronchitis, eczema, colic and spermatorrhea.
32	*Euphorbia neriifolia*	Euphorbiaceae	Danda-thor	Latex	Latex, when taken with common salt, used for curing various ailments, including whooping cough, dropsy, colic, jaundice, enlargement of the liver, asthma and leprosy.
33	*Ficus religiosa*	Moraceae	Pipal	Bark, leaves and roots	Leaves for religious rituals and therapeutic garlands. Bark, leaves and roots used in traditional medicine for gastrointestinal issues, skin diseases and respiratory problems.
34	*Leptadenia pyrotechnica (Forsk.) Decne.*	Asclepiadaceae	Khimp	Whole plant	Antiseptic properties for the treatment of burns and wounds. Rich in tannins.
35	*Mimosa hamata*	Mimosaceae	Alai	Seeds, Fresh leaf extract	Seed powder in buffalo milk as a tonic. Fresh leaf extract for checking bleeding from wounds and ulcers.
36	*Mollugo cerviana*	Molluginaceae	Chirio ghas	Plant	Cooked as a vegetable and used in postnatal care for ladies after childbirth.

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
37	*Momordica balsamina*	Cucurbitaceae	Bar karela	Fruits	Application on burns and treatment of hemorrhoids. Cathartic when consumed internally with hypoglycemic properties. Contains ribosome inactivating protein momordin II. Methanolic extract with phenylpropanoid esters for antihypertensive, analgesic and antibacterial activities.
38	*Momordica dioica*	Cucurbitaceae	Kankoda	Roots	Tuberous root for astringent, febrifuge, antiseptic, anthelmintic and spermicidal properties. Used in treating conditions like bleeding piles and urinary afflictions. Soothing sedative when applied during high fevers with delirium. Demonstrates anti-allergic activity.
39	*Ocimum americanum*	Lamiaceae	Bapchi	Seed	Plant with various medicinal properties including stimulant, carminative and diaphoretic. Leaves for bronchial and febrifuge effects. Essential oil with

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
					antifungal properties. Seeds for treating urinogenital system disorders. Contains citral and other components.
40	*Pedalium murex*	Pedaliaceae	Dakhni-gokhru	Whole plant, Fruits, Seeds	
41	*Prosopis cineraria*	Mimosaceae	Khejri, Jaanti	Gum and bark	Gum used to treat respiratory disorders, diarrhea and inflammation. Bark and pods used in traditional remedies for therapeutic effects.
42	*Physalis minima*	Solanaceae	Chirpotan	Ripe fruits	Ripe fruits used in dropsy, constipation and enlargement of the spleen. Also used in colic complaints.
43	*Polycarpaea corymbosa*	Caryophyllaceae	Zotniokhad	Flowers and Leaves	Leaves have anti-inflammatory properties and are applied topically as poultices. Used in cases of jaundice. Flowering head, stem and leaves act as an astringent and demulcent. Spermicidal agent.
44	*Portulaca oleracea*	Portulacaceae	Lunkia	Plant	Plant considered refrigerant and effective in scurvy and liver diseases. Plant sap used to relieve blisters and boils in the Meena

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
					tribe during scorching heat.
45	*Sida cordifolia*	Malvaceae	Kharanti	Seeds	Powdered seeds mixed with jaggery for elderly persons suffering from lumbago in winter.
46	*Solanum surattense*	Solanaceae	Ringani	Fruits	Used as a stimulant, expectorant, diuretic, laxative and febrifuge. Commonly used to treat various respiratory conditions, rheumatism, liver and spleen enlargement and more.
47	*Solanum indicum*	Solanaceae	Kateri	Fruits and Leaves	Root for carminative and expectorant properties, addressing colic, dysuria, coughs and catarrhal affections. Fruits and leaves contain glycoalkaloids and show antibacterial activity.
48	*Sonchus asper*	Asteraceae	Kalijibi	Plant	Plant extract applied externally on old wounds, boils and swellings. Paste of the plant applied on breasts to increase lactation.
49	*Tecomella undulata*	Bignoniaceae	Rohida	Root, Bark, leaves	Bark, leaves and flowers used to treat various ailments, including fever,

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
				and flowers	cough, digestive disorders, skin infections and joint pain. Bark is used as an astringent and for its anti-inflammatory properties.
50	*Tephrosia purpurea*	Fabaceae	Dhamaso	Plant, Root	Plant decoction used as an anthelmintic for children and as a blood purifier. Root powder taken with black pepper to cure dyspepsia, enlarged liver, impotency and snakebites.
51	*Tribulus terrestris*	Zygophyllaceae	Chhota gokhuru	Fruits and Leaves	Fruits diuretic, demulcent, anti-inflammatory, anabolic and more. Leaves diuretic and haemostatic. Root stomachic and diuretic. Root and fruit possess cardiotonic properties.
52	*Trianthema triquetra*	Aizoaceae	Lutanki	Plant paste	Plant paste applied on swellings due to rheumatism, suggesting anti-inflammatory and analgesic properties.
53	*Withania somnifera*	Solanaceae	Ashwagandha	Fruits, Seed and Roots	Root anti-inflammatory remedy for swellings, tumors, scrofula and rheumatism. Leaves anti-inflammatory,

S.N.	*Botanical Name*	Family	Local Name	Parts Used	Ethnomedicinal Uses
					hepatoprotective and antibacterial. Fruits and seeds diuretic. Withaferin A a major bioactive compound.
54	*Xanthium strumarium*	Asteraceae	Adhasisi	Roots, Leaves and shoots	Root antitumor properties. Leaves and shoots applied externally to treat venereal sores, herpes and scrofula. Leaves contain sesquiterpene lactones and other compounds.
55	*Zaleya redimita*	Aizoaceae	Gudalio satto	Fresh root	Fresh root decoction taken orally by men against syphilis and swellings of sex organs. Ladies use root extract to regularize menstruation.

Conclusion:

The ethnomedicinal application of plant species in Fatehpur and Ramgarh, Sikar district, Rajasthan, unfolds a fascinating narrative of the region's traditional healthcare practices. This knowledge, deeply intertwined with local culture, continues to provide valuable insights for traditional and modern healthcare alike. The preservation of this wisdom, sustainable plant utilization and further exploration of bioactive compounds hold promise for enhancing the well-being of the local population and offering novel avenues for scientific inquiry.

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