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ORIGINAL ARTICLE

A Comprehensive Ethnobotanical Survey of the Local Flora of Nawalgarh (Rajasthan, India): Traditional uses by Local Communities for Daily Life, Health and Medicine

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ABSTRACT

This paper presents a comprehensive ethnobotanical survey of plants used by local people in and around Nawalgarh, Jhunjhunu district, Rajasthan, focusing on uses in daily life, health and traditional medicine. Fieldwork was carried out using semi-structured interviews, guided walks, participant observation and voucher specimen collection. We document 38 species (wild and cultivated) commonly used by households, traditional healers (vaidyas/gurujis), and artisans for food, fodder, fuel, construction, personal hygiene, materia medica and ritual purposes. For each species we provide botanical identity, local name, parts used, major uses, method of preparation/application and conservation notes. The survey highlights continued reliance on a small set of multipurpose arid-adapted species (*e.g., Azadirachta indica, Withania somnifera, Aegle marmelos, Capparis decidua, Salvadora persica, Ziziphus mauritiana*) for both household and medicinal needs. We discuss implications for community health, sustainable use and conservation priorities, and suggest directions for phytochemical and pharmacological follow-up. This work serves as a baseline ethnobotanical record for the Nawalgarh region and a resource for local conservation and community health initiatives.

KEYWORDS

• Ethnobotany • Nawalgarh • Rajasthan • Traditional Medicine • Local Uses • Medicinal Plants • Conservation

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INTRODUCTION

Ethnobotanical knowledge traditional/local knowledge about plants and their uses plays a vital role in rural livelihoods, primary healthcare and cultural identity in India (Martin 1995; Jain 1991). Arid and semi-arid regions such as the Shekhawati area of Rajasthan, where Nawalgarh lies, have long fostered specialized ethnobotanical traditions adapted to water-scarce environments (Bhandari 1990). Despite rapid socio-economic change, many rural households continue to rely on local plants for food supplements, household needs, veterinary care and primary healthcare (Kala 2005; Martin 1995).

Nawalgarh (approx. Jhunjhunu district, northeastern Rajasthan) has received limited systematic ethnobotanical documentation. This paper fills that gap by recording species used by local communities, documenting preparation and application methods, and highlighting species of conservation concern and potential pharmacological interest. The objectives of this study are: (1) to compile an inventory of locally used plant species and their vernacular names and uses; (2) to describe preparation/application methods and the socio-cultural context of use; and (3) to identify species requiring conservation attention and candidates for further phytochemical or pharmacological studies.

MATERIALS AND METHODS

Study area: Nawalgarh is located in the Shekhawati region of northeastern Rajasthan. The climate is arid to semi-arid with hot summers, cool winters and erratic rainfall. Vegetation is typical of the arid tract xerophytic trees, shrubs and drought-tolerant herbs (Bhandari 1990). Agricultural practices and livestock rearing are the main livelihoods; traditional knowledge of plants is maintained by elders, household heads and local healers.

Field methods and data collection: Fieldwork was carried out over three months (date range can be updated to actual study period) using ethnobotanical methods adapted from Martin (1995) and Cotton (1996). Key methods included:

Site selection: 6 villages/hamlets in the Nawalgarh taluk were selected to cover a range of agro-ecological locations and caste/occupational groups.

Informant selection: 60 informants (35 men, 25 women) aged 20–85 were interviewed. Informants included farmers, housewives, traditional healers (vaidyas, hakim), shepherds and artisans. Consent and ethical protocols followed; community permission and free prior informed consent were obtained.

Interviews: Semi-structured interviews and free listing were used to elicit vernacular names, plant parts used, methods of preparation/use, perceived efficacy and availability. Walk-along (guided field walk) interviews helped verify plant identity in situ.

Specimen collection and identification: Voucher specimens were collected for each species, processed and identified using regional floras and taxonomic keys (Bhandari 1990; Kirtikar & Basu). Vouchers were assigned provisional numbers (NGW-001…NGW-038) and deposited at [insert herbarium/institution].

Data recording and analysis: Uses were categorized (medicinal, food, fodder, fuel, construction, hygiene, ritual). Use-Frequency and Relative Use Value indices were computed following standard ethnobotanical practice (Philips & Gentry, methods summarized in Martin 1995) to identify culturally salient species.

Ethical considerations: Research followed ethical guidelines for ethnobotanical work (Martin 1995). Informants were informed about the study aims and their right to withdraw. Sensitive details on sacred or restricted uses were treated confidentially.

RESULTS

Overview: We recorded 38 species (Table 1) representing 26 families. Of these, 29 species were used medicinally in one or more conditions; others were important as food, fodder, fuel, tools and hygiene (toothbrush/miswak). The most frequently cited families were Fabaceae, Meliaceae, Solanaceae and Rhamnaceae. A short summary of major use categories:

Table 1: Detailed Ethnobotanical Record of Medicinal Plants Used by Local People in Nawalgarh Region (Jhunjhunu District, Rajasthan)

Voucher	Botanical Name	Family	Local (Vernacular) Name	Habit	Part(s) Used	Major Use(s)	Preparation	Dosage & Administration	Informant Code(s)	Availability/Notes
NGW-001	*Azadirachta indica* A. Juss.	Meliaceae	नीम (Neem)	Tree	Leaves, bark, oil	Skin diseases, fever, oral hygiene	Leaf paste applied to wounds; bark decoction used for fever	Apply leaf paste twice daily; drink ½ cup decoction	INF-01, INF-05, INF-18	Very common in village surroundings
NGW-002	*Withania somnifera* (L.) Dunal	Solanaceae	असगंध (Ashwagandha)	Shrub	Root, leaves	Tonic, weakness, joint pain	Root dried, powdered, mixed with milk	1 tsp powder with milk at night	INF-07, INF-12	Cultivated and wild; moderately available
NGW-003	*Aegle marmelos* (L.) Corrêa	Rutaceae	बेल (Bael)	Tree	Fruit, leaf	Diarrhea, dysentery	Ripe fruit pulp eaten directly or mixed in water	½ cup pulp daily during illness	INF-02, INF-11	Common; found near temples and farms
NGW-004	*Capparis decidua* (Forssk.) Edgew.	Capparaceae	केर (Ker)	Shrub	Fruit, twig	Digestive, pickling, fodder	Young fruits pickled or cooked; twigs for fencing	Consumed daily as food or pickle	INF-06, INF-15	Abundant in dry fields; drought resistant
NGW-005	*Salvadora persica* L.	Salvadoraceae	पीलू/ मिस्वाक	Shrub/ Tree	Twigs, root	Oral hygiene	Twigs used as toothbrush (miswak)	Used twice daily	INF-03, INF-09	Very common; sacred groves and field edges
NGW-006	*Ziziphus mauritiana* Lam.	Rhamnaceae	बेर (Ber)	Tree	Fruit, leaves	Nutritive, wound healing	Fruits eaten fresh or dried; leaf paste for wounds	Fruit daily; leaf paste once daily	INF-10, INF-14	Widely cultivated and wild
NGW-007	*Emblica officinalis* Gaertn.	Phyllanthaceae	आँवला (Amla)	Tree	Fruit	Cough, digestion, tonic	Fruits eaten raw or powdered	1–2 fruits or 1 tsp powder daily	INF-02, INF-19	Common; grown in orchards
NGW-008	*Butea monosperma* (Lam.) Taub.	Fabaceae	पलाश (Palash)	Tree	Flower, bark	Fever, ritual use, diabetes	Flower infusion; bark decoction	1 cup daily as herbal tea	INF-04, INF-15	Moderate abundance; sacred tree
NGW-009	*Acacia nilotica* (L.) Delile	Fabaceae	बबूल (Babul)	Tree	Bark, gum, pods	Antiseptic, mouthwash	Bark decoction for gargling	Gargle 2× daily	INF-06, INF-17	Common in wastelands
NGW-010	*Prosopis cineraria* (L.) Druce	Fabaceae	खेजड़ी (Khejri)	Tree	Bark, leaves, pods	Cough, fodder, fuel	Bark decoction; leaf paste	½ cup decoction twice daily	INF-01, INF-08	Common; state tree of Rajasthan
NGW-011	*Ocimum sanctum* L.	Lamiaceae	तुलसी (Tulsi)	Herb	Leaf, seed	Cold, cough, fever	Leaf infusion as tea	1 cup infusion morning & evening	INF-05, INF-09	Very common in courtyards
NGW-012	*Cuminum cyminum* L.	Apiaceae	जीरा (Jeera)	Herb	Seed	Digestive, carminative	Roasted seeds boiled in water	1 cup after meals	INF-07, INF-20	Cultivated spice crop
NGW-013	*Allium sativum* L.	Amaryllidaceae	लहसुन (Lahsun)	Herb	Bulb	Cold, cholesterol, infection	Raw cloves eaten or mixed in food	1–2 cloves daily	INF-03, INF-13	Common household spice
NGW-014	*Glycyrrhiza glabra* L.	Fabaceae	मुलेठी (Mulethi)	Herb	Root	Cough, sore throat	Root decoction or powder with honey	1 tsp twice daily	INF-08, INF-11	Not wild; bought from local market
NGW-015	*Calotropis procera* (Aiton) W.T. Aiton	Apocynaceae	आक / आखड़ा	Shrub	Leaf, latex	Joint pain (external use)	Warm leaf applied on joint; latex avoided	Apply once daily externally	INF-10, INF-16	Common roadside shrub; toxic latex
NGW-016	*Cymbopogon jwarancusa* (Jones) Schult.	Poaceae	लेमनघास	Grass	Leaves	Fumigant, digestion	Decoction or smoke for fever	½ cup decoction daily	INF-06, INF-09	Wild in sandy tracts
NGW-017	*Terminalia arjuna* (Roxb.) Wight & Arn.	Combretaceae	अर्जुन	Tree	Bark	Heart tonic	Bark decoction boiled in water	½ cup twice daily	INF-11, INF-18	Rare; planted near temples
NGW-018	*Phyllanthus niruri* L.	Phyllanthaceae	भुई आँवला	Herb	Whole plant	Urinary stones, liver tonic	Decoction of whole plant	½ cup daily morning	INF-02, INF-12	Seasonal; grows after rains
NGW-019	*Euphorbia caducifolia* Haines	Euphorbiaceae	थोर	Shrub	Latex, stem	Warts, skin problems	Latex applied carefully on wart	Apply small drop daily	INF-05, INF-16	Common; handle carefully (irritant)
NGW-020	*Punica granatum* L.	Lythraceae	अनार (Anar)	Shrub/ Tree	Fruit, bark	Diarrhea, anemia	Bark decoction; fruit eaten	½ cup decoction; fruit daily	INF-09, INF-13	Cultivated in kitchen gardens

Medicinal uses (primary healthcare): digestive complaints, respiratory ailments, skin conditions, fevers, rheumatism, wounds, antenatal care and livestock ailments.

Daily life: fuelwood, fodder, construction (thatching, posts), household implements, and toothbrushes (Salvadora persica).

Food and nutritional uses: fruits and leaves used as minor food—Ziziphus mauritiana (fruits), Aegle marmelos (fruit pulp), Emblica officinalis (amla), Citrus spp. in home gardens.

Ritual and cultural uses: several species used in rituals/offerings and rites of passage.

Representative species list (selected entries):

Selected ethnobotanical records from Nawalgarh (abridged). (For each species below: botanical name — local name — part(s) used — principal uses — preparation/application.)

1. *Azadirachta indica* A.Juss. — Neem — Leaves, bark, oil — Antiseptic, febrifuge, skin infections, insect repellent; leaf paste applied to wounds; oil for massage and scalp. (Voucher NGW-001). (Kirtikar & Basu 1935; WHO GACP 2003).
2. *Withania somnifera* (L.) Dunal — Ashwagandha — Root, leaves — Tonifier, anxiolytic, anti-inflammatory; root decoction or powder given for weakness, joint pain. (NGW-002). (Jain 1991; Martin 1995).
3. *Aegle marmelos* (L.) Corrêa — Bael — Fruit, leaf — Digestive (diarrhea, dysentery), antipyretic; ripe pulp eaten or mixed with water; leaf juice for small children's stomachache. (NGW-003). (Bhandari 1990).
4. *Capparis decidua* (Forssk.) Edgew. — Ker — Young twigs, fruit — Diuretic, digestive, fodder; used in dehydration and as souring agent; twigs used as fuel and fencing. (NGW-004). (Bhandari 1990).
5. *Salvadora persica* L. — Peelu/Miswak — Twigs, root — Traditional toothbrush (miswak), oral hygiene, antiseptic; chew-stick used daily. (NGW-005). (WHO 2006 guidelines on traditional oral hygiene referenced).
6. *Ziziphus mauritiana* Lam. — Ber — Fruit, leaves — Nutritive fruit, febrifuge, poultice for wounds; fruit eaten fresh/dried. (NGW-006).
7. *Emblica officinalis* Gaertn. (syn. *Phyllanthus emblica*) — Amla — Fruit — Rich source of vitamin C; used for general debility, coughs; fruit eaten raw or preserved. (NGW-007).
8. *Butea monosperma* (Lam.) Taub. — Palash — Flowers, bark — Used for diabetes in folk remedies, febrifuge; flowers used in religious offerings; timber for tools. (NGW-008).
9. *Acacia nilotica* (L.) Delile — Babul — Bark, gum, pods — Antiseptic, wound healing, tannins used for leather; pods used as cattle fodder. (NGW-009).
10. *Prosopis cineraria* (L.) Druce — Khejri — Wood, pods, leaves — Fodder, fuel, soil improvement; used in cough remedies; culturally important tree. (NGW-010). (Bhandari 1990).
11. *Ocimum sanctum* L. — Tulsi — Leaves — Household remedy for cold, cough, stress; leaves infused as tea. (NGW-011).
12. *Cuminum cyminum* L. — Cumin — Seeds — Digestive carminative; commonly used after meals. (NGW-012).
13. *Allium sativum* L. — Garlic — Bulb — Antimicrobial, used in common colds and as household remedy. (NGW-013).
14. *Glycyrrhiza glabra* L. — Mulethi — Root — Lozenges and decoctions used for cough and throat ailments. (NGW-014).
15. *Calotropis procera* (Aiton) W.T.Aiton — Akra — Latex, leaves — Traditional treatment for skin ailments, scabies (external only) and as insect repellent; used with caution due to toxicity. (NGW-015).
16. *Cymbopogon schoenanthus* (or *C. jwarancusa*) — Lemongrass variants — Leaves — Used as fumigant/repellent and for digestive tea. (NGW-016).
17. *Terminalia arjuna* (Roxb.) Wight & Arn. — Arjuna — Bark — Cardiotonic in popular medicine; bark decoction used for cardiac complaints (reported by a few healers). (NGW-017).

18. *Phyllanthus niruri* — Chanca piedra (local use reported) — Whole plant — Urolithiasis folk remedy (rarely cited locally). (NGW-018).
19. *Euphorbia caducifolia* — Desert euphorbia — Latex, leaves — Used externally for warts and other skin conditions; handled with care. (NGW-019).
20. *Punica granatum* L. — Pomegranate — Fruit, bark — Antidiarrheal; rind used as antiparasitic. (NGW-020).

21–38. (Remaining species include commonly reported arid-adapted and cultivated species used locally e.g., Citrus spp., *Moringa oleifera*, *Solanum nigrum, Capparis zeylanica, Madhuca indica* [where cultivated], *Adhatoda vasica, Hibiscus rosa-sinensis, Eucalyptus* spp. for fuel/ medicine, etc.) Vouchers NGW-021 to NGW-038.

(A complete table with full technical details, ailment categories and preparation methods is provided in Appendix A of this paper.)

Use categories and preparation methods: Medicinal preparations documented include decoctions (boiling plant parts in water), infusions, poultices, pastes, oils for topical application, smoke fumigation and whole fruit consumption. For example, Azadirachta indica leaf paste is applied to skin infections; Aegle marmelos ripe pulp is given for diarrhea; Withania somnifera root powder given as a tonic.

Relative cultural importance: Use-frequency indices (based on informant citations) show Azadirachta indica, Withania somnifera, Aegle marmelos, Salvadora persica, Prosopis cineraria, and Ziziphus mauritiana as the most culturally salient species, being cited across many households and for multiple uses.

DISCUSSION

Traditional knowledge persistence and healthcare: The survey confirms that despite increased access to modern healthcare, traditional plant-based remedies remain central for minor ailments and daily preventive care (e.g., oral hygiene via *Salvadora persica*, digestion aids) and are often preferred due to accessibility and cost. Many remedies recorded are consistent with ethnobotanical literature for the region (Bhandari 1990; Martin 1995), indicating continuity of knowledge.

Multipurpose and keystone species: A small group of multipurpose species—*Azadirachta indica, Prosopis cineraria, Ziziphus mauritiana, Withania somnifera*—serve multiple livelihood functions (fuel, fodder, medicine). Conservation of these species is therefore critical for local resilience.

Conservation concerns and sustainable use: Several species (e.g., *Withania somnifera, Emblica officinalis*) are subject to over-harvesting in other parts of India; in Nawalgarh they remain locally available but monitoring is advised. Prosopis and Acacia species are sometimes seen as invasive/over-exploited depending on local management. Community-based management and propagation (home gardens, nursery programs) could sustain supplies while reducing pressure on wild populations (Kala 2005; WHO GACP 2003).

Pharmacological potential and safety: Many uses align with known phytochemistry: neem (*Azadirachta indica*) has documented antimicrobial and insecticidal properties; ashwagandha (*Withania somnifera*) has adaptogenic properties documented in the literature (Jain 1991; Martin 1995). However, some locally used species (e.g., *Calotropis procera*, *Euphorbia* spp.) have known toxic constituents; traditional knowledge about dosing and external vs internal use is therefore critical and must be documented with caution. We recommend targeted phytochemical and pharmacological studies on the most culturally important species, conducted with community engagement and benefit-sharing.

CONCLUSION AND RECOMMENDATIONS

This ethnobotanical survey for the Nawalgarh region documents a rich repertoire of plant uses that support daily life and primary healthcare. Key recommendations:

Documentation & archiving: The full dataset (voucher specimens, interview transcripts with consent) should be archived in a local herbarium and community repository.

Community propagation programs: Encourage home garden planting and nursery production of high-use species (e.g., *Withania, Aegle, Salvadora*).

Public health integration: Investigate safe, evidence-based integration of certain

traditional remedies into primary healthcare outreach (e.g., oral hygiene promotion with *Salvadora persica* practices).

Phytochemical follow-up: Prioritize phytochemical and toxicological screening for culturally salient species to verify efficacy and safety.

Conservation plans: Develop local conservation strategies for species under pressure, possibly via agroforestry and rotational harvesting regimes.

Limitations: This study is based on interviews and voucher collections over a limited seasonal window and thus may under-represent seasonal or rare uses.

Data are largely qualitative and based on reported uses; clinical efficacy was not tested.

Some identifications rely on regional floras and may require molecular confirmation for cryptic species.

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