

Ethnomedicinal Plant Diversity, Harvesting Patterns and Traditional Healthcare Practices in Jaipur District, Rajasthan, India

Dr. Savita Singhal¹, Dr. Nidhi Chaturvedi²

¹Assistant Professor, Department of Botany, Jaipur College of Education and Science, Jaipur, Rajasthan, India

²Associate Professor, Department of Basic Life and Applied Sciences, APEX University, Jaipur, Rajasthan, India

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ABSTRACT

Traditional plant knowledge remains important to primary healthcare and biocultural continuity in rural and tribal communities of Rajasthan. This study re-analysed the ethnomedicinal component of an 18-month floristic and ethnobotanical investigation conducted in Jaipur district during 2020–2022. The original work used repeated seasonal collection tours, purposive and accessibility-based engagement with locally knowledgeable participants, individual and group discussions, participant observation, guided plant walks, botanical collection and herbarium preparation. The dataset comprises 121 medicinal taxa (117 angiosperms and four pteridophytes). Leaves were reported for 63 taxa (52.06%), followed by roots for 36 (29.75%), seeds for 28 (23.14%), whole plants for 27 (22.31%) and fruits for 25 (20.66%). Herbs (45 taxa; 37.19%) and trees (41; 33.88%) dominated the growth-habit spectrum; phanerophytes (51; 42.14%) and therophytes (43; 35.54%) dominated the life-form spectrum. Fresh non-exclusive coding of the archived remedy descriptions identified gastrointestinal uses for 66 taxa, dermatological/oral/wound uses for 64, metabolic/systemic uses for 57 and musculoskeletal/inflammatory uses for 53. Of 225 plant-part use occurrences, 65 (28.9%) involved roots, rhizomes or whole plants and were classified as potentially destructive. These counts describe the breadth of recorded knowledge, not treatment efficacy or informant consensus. Because the archive lacks a complete participant-level matrix and a voucher catalogue with accession numbers, use value, fidelity level and informant consensus factor were not reconstructed, and taxonomic names remain subject to voucher-based revalidation. The study supplies a transparent regional baseline for conservation prioritisation, renewed consent-based fieldwork and pharmacological screening.

Keywords: ethnobotany; ethnomedicine; Jaipur district; medicinal plants; traditional knowledge; plant-part use; harvesting pressure; conservation

INTRODUCTION

Ethnobotany examines relationships between people and plants, including medicinal, nutritional, material, religious and livelihood uses (Harshberger, 1896; Berlin, 1992; Cotton, 1996; Albuquerque et al., 2017). Ethnomedicine, a major component of ethnobotany, concerns culturally embedded knowledge and practice relating to health and illness. Such knowledge can guide botanical, pharmacological and conservation research, but documentation of traditional use must not be treated as proof of clinical efficacy (Fabricant and Farnsworth, 2001; Martin, 2004; Heinrich et al., 2006; Heinrich, 2014).

Non-codified medicinal knowledge is commonly transmitted through families, healers and community practice (Upadhyaya et al., 2014). It may decline when habitats are altered, access to plant resources changes or younger generations disengage from oral traditions (Benz et al., 2000; Leonti, 2011). Ethnobotanical records therefore have value both as scientific observations and as documentation of biocultural heritage (Rajasekaran and Warren, 1994; Srithi et al., 2009; Vandebroek and Balick, 2012). Recent Indian research continues to document substantial medicinal-plant knowledge while demonstrating the importance of transparent sampling, use-report

denominators and safety-aware interpretation (Ralte and Singh, 2024; Muthukrishnan and Ramachandran, 2025; Jisitu et al., 2025; Subba Limboo et al., 2026; Siddamurthy and Araveeti, 2026).

Rajasthan combines arid and semi-arid environments with long-established rural, tribal, pastoral and religious plant-use traditions. Jaipur district contains urban, peri-urban, agricultural, rocky, scrub, wetland and forest-associated habitats. The thesis underlying this article documented floristic diversity together with medicinal, edible, religious, cosmetic and economic uses. The present paper isolates the medicinal dataset, recovers field-method details from the thesis, and adds reproducible descriptive analyses while preserving the limits of the surviving archive.

The objectives were to: (i) document medicinal-plant richness; (ii) describe plant parts, growth habits and Raunkiaerian life forms; (iii) code broad therapeutic-use categories from archived remedy descriptions; (iv) classify plant-part occurrences by harvesting pressure; and (v) interpret implications for conservation, renewed documentation and pharmacological prioritisation without making clinical-efficacy claims.

MATERIALS AND METHODS

Study area and field period

The work was conducted in Jaipur district, Rajasthan, India, during 2020–2022 and comprised 18 months of field activity. The district lies in eastern Rajasthan and includes Aravalli hill systems, rocky slopes, scrub, dry forest, cultivated land, settlements, roadsides, seasonal drainage lines and wetlands. The thesis describes an eastern semi-arid, subtropical monsoonal climate with hot summers, a July–September rainfall concentration and marked seasonal variability. Field routes covered rural and urban-associated environments and accessible reserve-forest, sanctuary-fringe, agricultural and settlement habitats.

For socio-ecological description, villages were grouped into three spatial strata: settlements within or immediately adjoining reserve forests and sanctuaries, settlements on protected-area boundaries, and settlements approximately 2–10 km from those boundaries. The thesis lists 13 tehsil-level units and 72 villages in Jaipur taluka as the wider geographic frame; however, it does not preserve a reliable visit-by-visit locality register. These figures are therefore not reported as the number of sampled villages.



Figure 1. Jaipur district study-area context reproduced from the thesis study-area map. The original base-map credit is retained within the image. The surviving archive does not support plotting verified interview or collection coordinates.

Participant engagement and data collection

The thesis indicates purposive and accessibility-based engagement with people considered locally knowledgeable; it does not describe probability sampling. Participants and corroborating contacts included Ojhas, Bhopas, Mukhias, Vaidyas, experienced villagers, selected tribal participants of different ages, forest personnel, teachers, government and postal personnel, social workers and other residents familiar with the local flora. Remote sites were approached on foot or by bicycle, while roadside and accessible sites were reached by vehicle. Community gatherings, fairs and guided forest visits were also used to observe plant products and practices.

Information was collected through individual interviews, repeated informal or discursive discussions, group gatherings, enquiry, observation, participation and guided plant walks. A questionnaire template recorded participant name, age, sex, occupation, caste, experience, source of knowledge, vernacular plant name and plant uses. Plant-specific notes covered parts used, collection, processing, preparation, dose, administration and combination with other plants where available. Information was revisited or discussed with additional contacts when feasible. The final number, age distribution and gender distribution of participants, interview frequency and locality-by-participant matrix are not recoverable from the archived thesis and are not estimated here.

Botanical collection, herbarium preparation and identity status

Plants were collected during seasonal excursions, preferably with flowers or fruits. When reproductive structures were absent, vegetative material was collected and accompanied by field notes. The thesis reports that voucher specimens and herbarium sheets were prepared and that material was arranged by family, genus and species. Photographs were also taken for common and ethnobotanically important plants. The surviving archive does not contain a consolidated voucher-number range, accession catalogue or confirmed herbarium repository. Consequently, all names in this paper are explicitly treated as thesis-recorded identities pending specimen-level re-examination. No unverified name was silently replaced with a currently accepted name. Future reconciliation should compare the physical vouchers with a current taxonomic authority such as Plants of the World Online (Royal Botanic Gardens, Kew, 2026).

Data extraction and fresh descriptive analysis

Medicinal richness, plant-part percentages, growth habits and life-form percentages were transcribed from thesis Tables 5.17–5.19. Percentages were converted to integer taxon counts by multiplying by 121 and confirming that rounded counts reproduced the reported percentages. Plant-part categories are non-exclusive because a taxon may contribute several parts; they must not be summed as independent taxa.

For additional descriptive analysis, each of the 121 remedy narratives was coded against ten broad, pre-defined therapeutic categories using explicit ailment terms in the thesis text: respiratory; gastrointestinal; dermatological/oral/wounds; musculoskeletal/inflammatory; fever/infection/parasites; urinary/renal; reproductive/sexual health; bites/stings; neurological/sensory; and metabolic/systemic. Categories were non-exclusive. A taxon was counted once per category regardless of the number of remedies mentioned. This is a content analysis of recorded indications, not a measure of citation frequency, consensus, prevalence, safety or efficacy.

Plant-part occurrences were additionally assigned to three harvesting-pressure classes: renewable tissues (leaves, flowers, fruits and seeds), potentially damaging tissues (stem, bark and wood), and destructive collection (roots, rhizomes and whole plants). The classification indicates plausible tissue-level impact only. Actual extraction intensity, technique, season, abundance and regeneration were not measured, so species-level sustainability cannot be inferred from these classes.

Ethical and interpretive safeguards

The original thesis describes direct interviews, participation and a questionnaire, but the surviving archive does

not contain a research-ethics committee approval number or participant-level consent records. No retrospective claim of formal ethics approval or documented written consent is therefore made. Personal identifiers are not reproduced in this article. Any renewed fieldwork, public dissemination of identifiable knowledge or commercial follow-up should obtain prior informed consent, protect restricted knowledge and establish fair benefit-sharing in accordance with the International Society of Ethnobiology Code of Ethics (International Society of Ethnobiology, 2006). Traditional-use reports are ethnographic observations, not therapeutic recommendations. Potentially toxic plants and reports involving abortion, snakebite, severe infection or chronic disease require professional care and dedicated toxicological assessment (Leung, 2006).

RESULTS

Taxonomic richness

The survey documented 121 medicinal taxa, including 117 angiosperms (96.69%) and four pteridophytes (3.31%). This inventory represents the breadth of taxa documented in the thesis; it does not indicate the prevalence of use in the district population.

Taxonomic group	Number of taxa	Share (%)
Angiosperms	117	96.69
Pteridophytes	4	3.31
Total	121	100.00

Table 1. Taxonomic composition of the documented medicinal flora.

Plant parts and harvesting pressure

Leaves were reported for 63 taxa (52.06%), followed by roots for 36 (29.75%), seeds for 28 (23.14%), whole plants for 27 (22.31%) and fruits for 25 (20.66%). Because categories overlap, the 225 part-use occurrences exceed the number of taxa.

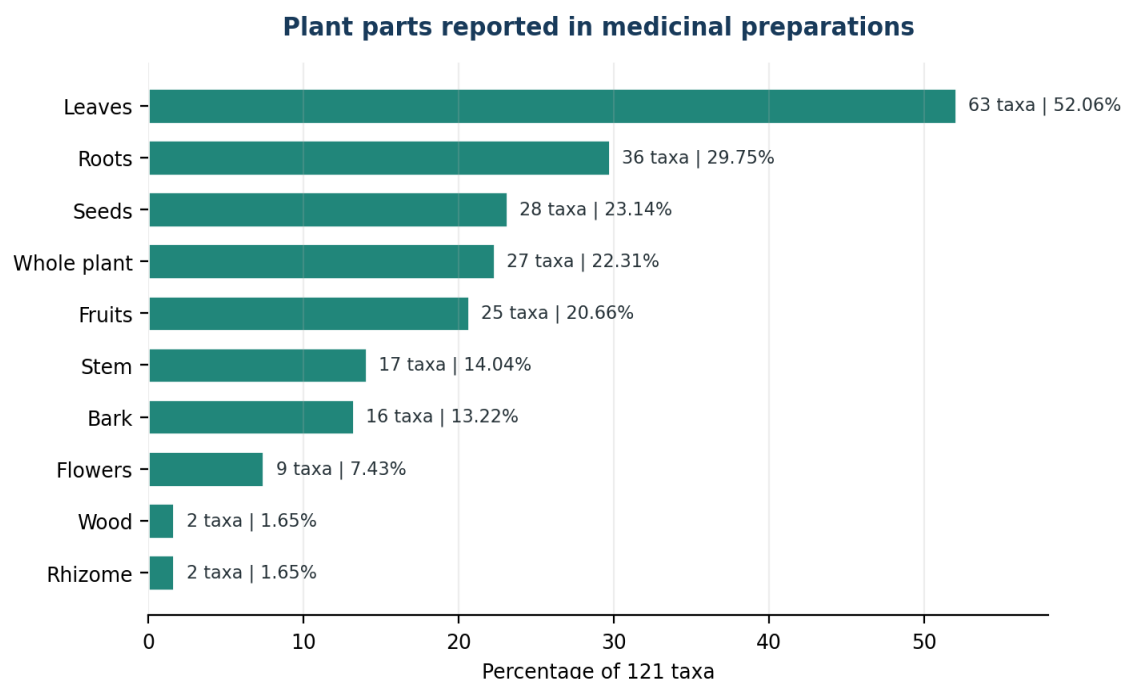


Figure 2. Plant parts reported in medicinal preparations. Counts are reconstructed from the thesis percentages for 121 taxa; categories are non-exclusive.

Fresh harvesting-pressure classification assigned 125 of 225 part-use occurrences (55.6%) to renewable tissues, 35 (15.6%) to potentially damaging tissues and 65 (28.9%) to destructive collection. “Renewable” does not mean

impact-free: intensive defoliation or seed and fruit removal may reduce growth or recruitment. Conversely, actual damage from bark, root or whole-plant collection depends on technique, intensity and regeneration, none of which were quantified.

Harvest-pressure classification of reported plant parts

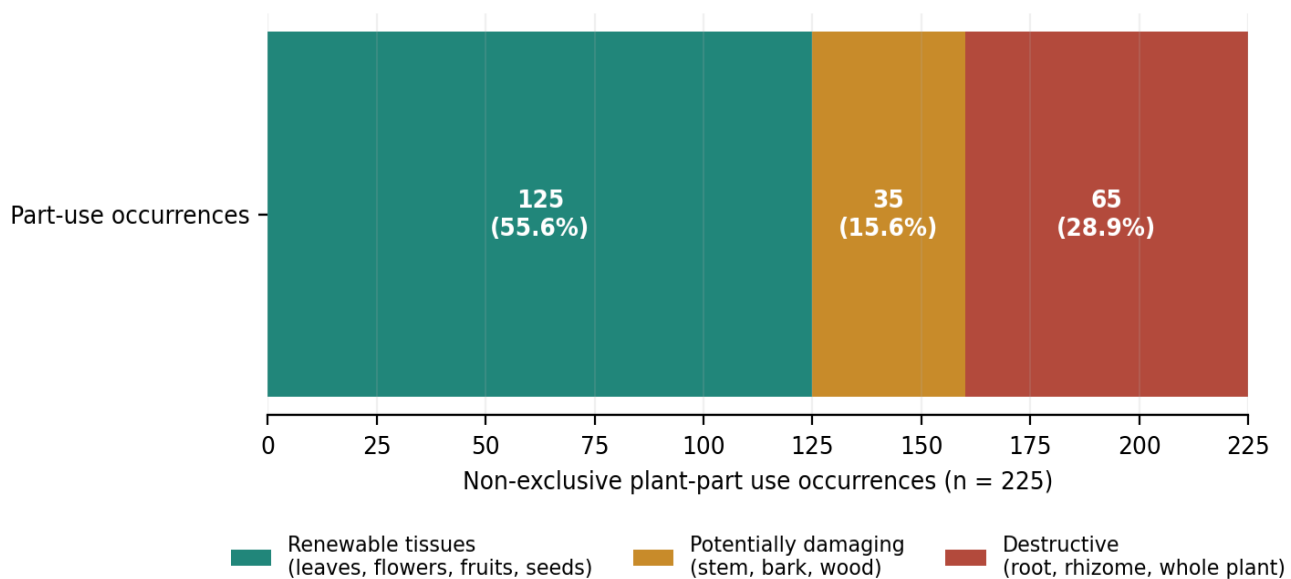


Figure 3. Tissue-level harvesting-pressure classification of 225 non-exclusive plant-part use occurrences. This is a conservation-screening framework, not a measured extraction-impact assessment.

Growth habits and life forms

Herbs formed the largest growth-habit group (45 taxa; 37.19%), followed by trees (41; 33.88%). Shrubs and under-shrubs together contributed 26 taxa, while climbers and lianas contributed nine.

Growth-habit composition of medicinal taxa

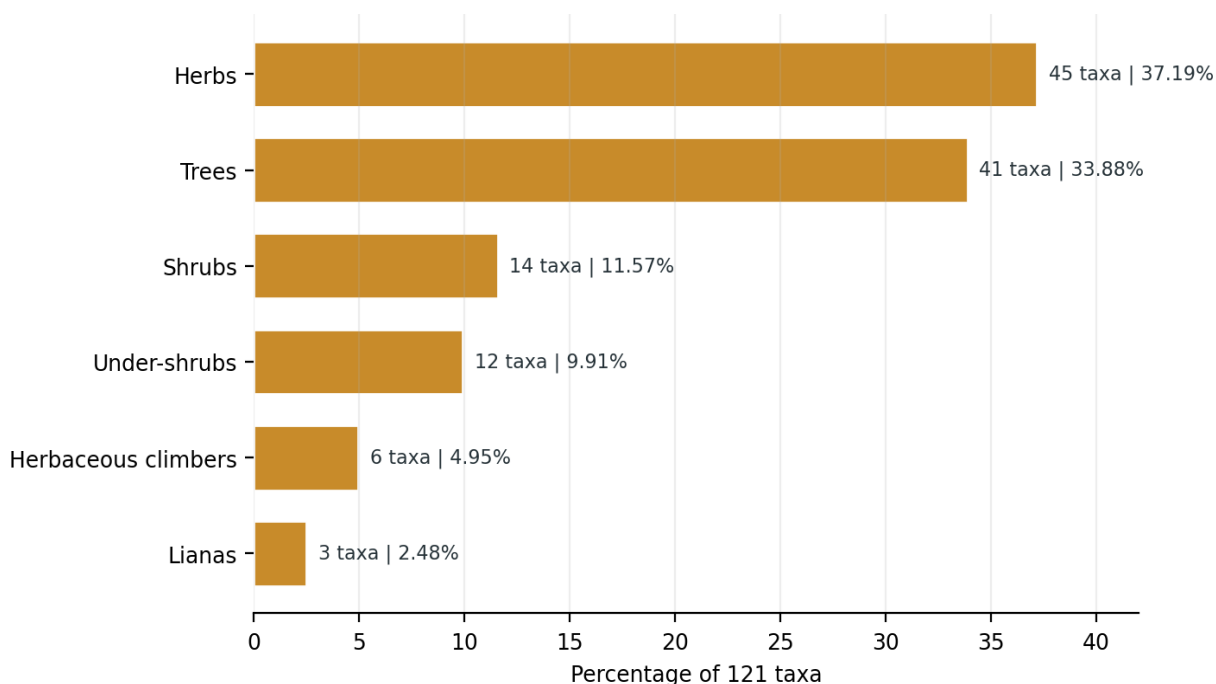


Figure 4. Growth-habit composition of the 121 medicinal taxa.

Phanerophytes (51 taxa; 42.14%) and therophytes (43; 35.54%) dominated the life-form spectrum. Hemicryptophytes, cryptophytes and chamaephytes together accounted for 27 taxa.

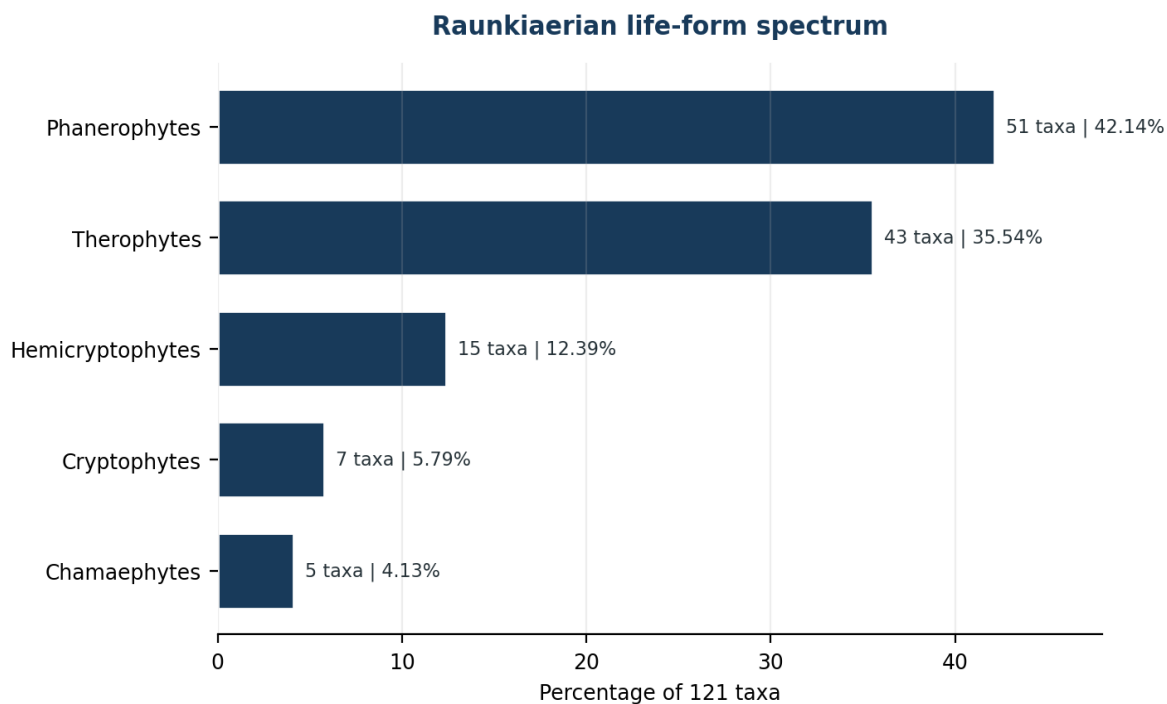


Figure 5. Raunkiaerian life-form spectrum of the documented medicinal taxa.

Therapeutic-use categories and multi-use records

Non-exclusive content coding identified gastrointestinal indications for 66 taxa (54.5%), dermatological/oral/wound uses for 64 (52.9%), metabolic/systemic uses for 57 (47.1%) and musculoskeletal/inflammatory uses for 53 (43.8%). Respiratory uses involved 39 taxa (32.2%) and fever/infection/parasite uses involved 37 (30.6%). A total of 111 taxa (91.7%) contained terms matching at least two broad categories, reflecting multi-purpose descriptions rather than informant agreement.

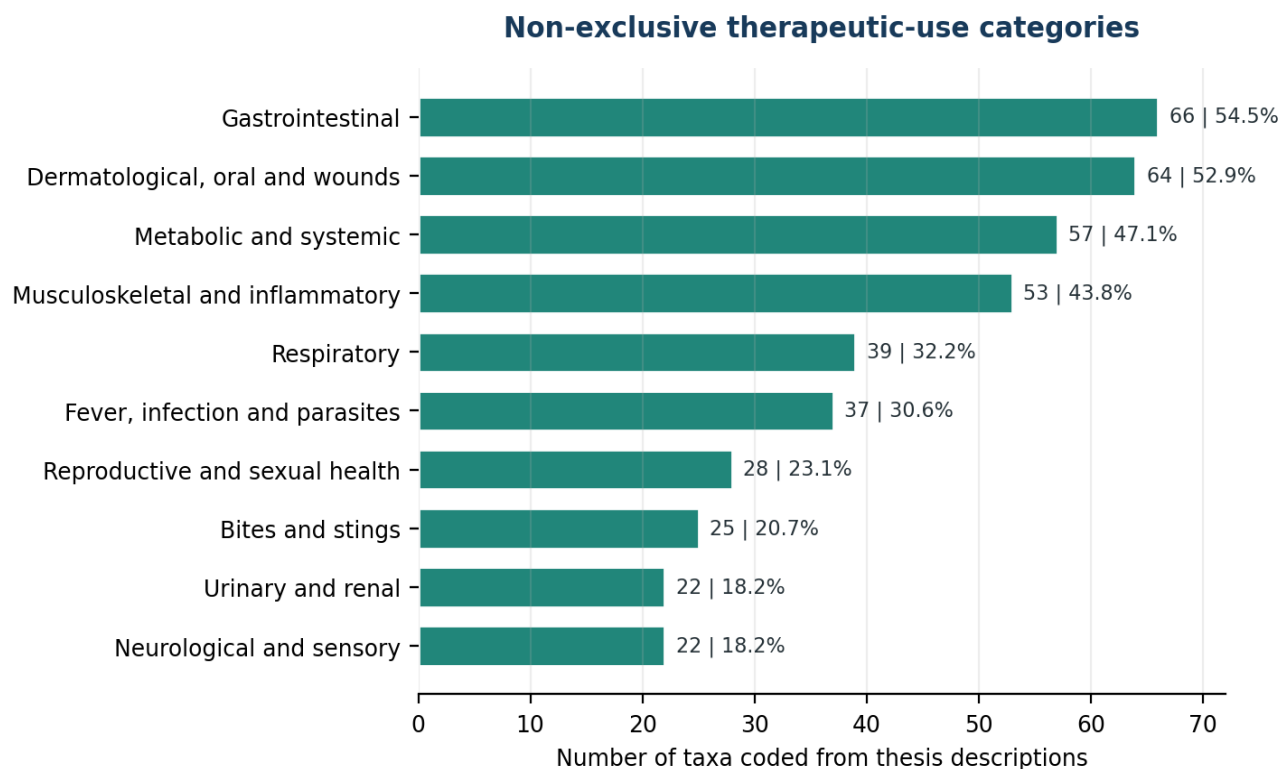


Figure 6. Non-exclusive therapeutic-use categories coded from the 121 thesis narratives. A taxon may occur in several categories; counts do not represent use reports, consensus or treatment outcomes.

Therapeutic-use category	Taxa coded	Share of taxa (%)
Gastrointestinal	66	54.5
Dermatological, oral and wounds	64	52.9
Metabolic and systemic	57	47.1
Musculoskeletal and inflammatory	53	43.8
Respiratory	39	32.2
Fever, infection and parasites	37	30.6
Reproductive and sexual health	28	23.1
Bites and stings	25	20.7
Urinary and renal	22	18.2
Neurological and sensory	22	18.2

Table 2. Descriptive coding of archived medicinal-use narratives. Categories are non-exclusive.

Preparation and administration

The archive records raw plant parts, juices, powders mixed with food or other ingredients, freshly crushed extracts, ash, poultices, decoctions, pastes, oils, toothbrush use, contact treatment by tying material to the body and complex preparations containing more than one plant. Oral and external routes were both represented. Dose, duration, contraindications and adverse events were not consistently retained, preventing comparison of preparation safety or effectiveness.

Representative medicinal records

Botanical name	Family	Local name	Thesis-recorded use
Abelmoschus moschatus Medic.	Malvaceae	Muskdana	Seeds are stimulant, antispasmodic, cooling tonic, carminative and aphrodisiac. Seeds powders are given orally with honey in black cough.
Abrus precatorius L.	Fabaceae	Ratti / Chirmi	Decoction of root is used in cough and cold, colic pain and also in abortion. The seeds are purgative, tonic and aphrodisiac.
Abutilon indicum (L.) Sweet	Malvaceae	Kanghi	The seeds are laxative; its powder is used in constipation. Seeds are known antidote for the scorpion bite. The leaves of the plant are eaten, cooked for the treatment of bleeding piles, and juice is used for stone in bladder. Root powder is used in fever.
Acacia nilotica (L.) Willd.	Mimosaceae	Babool / Bulia	Its properties are purgative and abortifacient. Young leaves and gum are used to cure urinogenital disease and used as a blood purifier. Bark is applied in sore throat and mouth ulcers. Twigs and barks are used in toothache.
Achyranthes aspera L.	Amaranthaceae	Aandhi jhara	The juice of leaves is valuable in stomach disorders, kidney problem and is also applied externally over cuts and wounds. Root and seed powder are given as an antidote in scorpion sting, dog and snake bite. Seeds mixed with milk are used as tonic.
Actiniopteris radiata Link.	Pteridaceae (Pteridophyte)	Morpankhi	Crushed fresh leaves are taken orally with water as anthelmintic. Ash and paste of the leaves is used in bronchitis. It overcomes irregularity in menses period.

Adiantum capillus – veneris L.	<i>Pteridaceae</i> (<i>Pteridophyte</i>)	Hansraj	Leaf juice and decoction of leaves are used as expectorant in bronchitis.
Adhatoda zeylanica Medic.	<i>Acanthaceae</i> Common name: <i>Adusa</i>	Adusa	Leaf decoction is used in bronchitis and cough. It is good medicine for Asthma. Leaf paste is used externally in nerve pain.
Aegle marmelos (L.) Corr.	<i>Rutaceae</i>	Bel / Bello	Leaves are used in ulcer, jaundice, diabetes and malarial fever. Fruit juices are used in stomach disease.
Alangium salvifolium (L. f.) Wangerin	<i>Alangiaceae</i>	Ankola	Seed oil is used in paralysis. It remove weakness and useful in skin disease. Root bark is used orally in treatment of snake bite, fever and skin disease.
Albizia lebbeck (L.) Benth.	<i>Mimosaceae</i>	Siris	Decoction of bark, leaves and fruit is given in case of anemia and for curing itch. The leaf paste is applied in snake bite and scorpion sting. Flowers are used externally in treating boils, skin eruption and swellings.
Aristolochia indica L.	<i>Aristolochiaceae</i>	Goriser	Root powder used in uterine contraction, leucoderma, fever, snake-bite and anthelmintic disease.
Azadirachta indica A. Juss.	<i>Meliaceae</i>	Neem / Neemdo	The decoctions of the leaves are taken orally with inflorescence in cure of malarial fever. Leaves poultice are used locally in snake-bite. Juice of leaves are taken orally as blood purifier and prevent intestinal helminthes. Paste of seed are used in skin disease. Bark is used in malarial fever, cough, cold and ulcers. Leaves and seed are used in leprosy and skin disease.
Calotropis gigantea (L.) R. Br.	<i>Asclepiadaceae</i>	Safed Akada	Root bark paste is used in dysentery. Leaves paste used as poultice for inflammatory swellings. Latex applied externally to heal obstinate ulcers and wounds.

Table 3. Representative ethnomedicinal records. These are traditional-use reports, not clinical recommendations. The complete inventory appears in Supplementary Table S1.

DISCUSSION

Leaf predominance and conservation interpretation

Leaf predominance is consistent with recent Indian field studies (Ralte and Singh, 2024; Muthukrishnan and Ramachandran, 2025). Leaves are accessible and can often be collected without killing perennial plants, but the observed frequency is not direct evidence of sustainability. Repeated or poorly timed defoliation may reduce growth, reproduction and resilience. The present classification therefore separates tissue renewability from measured harvest impact.

Roots, rhizomes and whole plants represented 28.9% of all recorded part-use occurrences and warrant priority attention. Root removal and whole-plant collection can eliminate individuals, while bark stripping and stem or wood removal can cause physiological injury. Species-specific conservation should prioritise combinations of destructive collection, limited distribution, slow regeneration and market demand (Schippmann et al., 2002; Ved and Goraya, 2007). Cultivation, rotational collection, partial harvesting and community monitoring should follow species-appropriate good collection practices (World Health Organization, 2003).

Ecological pattern: observation versus explanation

The observed dominance of herbs and therophytes is compatible with seasonal vegetation and disturbed or open habitats in semi-arid landscapes; however, rainfall, disturbance intensity, population dynamics and recruitment were not experimentally related to the medicinal inventory. Likewise, the phanerophyte component shows the

importance of persistent woody resources but does not quantify woodland condition. These explanations should be treated as ecological hypotheses. Conservation planning should consider forests, scrub, fallows, field margins, rocky slopes, sacred spaces, home gardens, roadsides and wetlands rather than assuming that medicinal taxa are restricted to one habitat type.

Breadth of therapeutic knowledge

The new content analysis shows that recorded knowledge was distributed across gastrointestinal, dermatological, musculoskeletal, respiratory, febrile, urinary, reproductive and other categories. The high proportion of multi-category taxa reflects the breadth of narrative claims and the deliberately broad coding framework. It does not establish that a plant was frequently cited, culturally preferred or effective. Modern quantitative studies can estimate cultural salience and agreement only when individual use reports and denominators are preserved (Ralte and Singh, 2024; Jishtu et al., 2025; Subba Limboo et al., 2026; Siddamurthy and Araveeti, 2026).

Biocultural significance and ethical continuity

The original fieldwork engaged healers, elders and community members whose knowledge was embedded in everyday livelihood, ritual and health practices. Comparable research has warned that local knowledge may erode through ecological change and weakening intergenerational transmission (Srithi et al., 2009; Vandebroek and Balick, 2012). Documentation is necessary but insufficient: future work should use community-approved local-language records, recognise knowledge holders, protect restricted information and develop benefit-sharing arrangements before commercial or intellectual-property use.

Botanical revalidation and pharmacological prioritisation

The absence of an accessible voucher catalogue is a material limitation. Before taxonomic, conservation or pharmacological claims are extended, physical specimens should be located, assigned accession numbers, re-examined and reconciled with current nomenclature (Royal Botanic Gardens, Kew, 2026). Records retained only from the thesis should remain visibly distinguished from voucher-verified records in any future database.

Laboratory follow-up should not treat every remedy as equally ready for development. A defensible sequence would verify specimens and accepted names, assess conservation status and toxicity, repeat culturally sensitive documentation with consent, identify repeatedly reported species using a complete use-report matrix, standardise extracts and then test biologically plausible activities. Ethnopharmacology can provide leads when traditional knowledge is integrated with rigorous chemical and pharmacological evaluation (Patwardhan and Mashelkar, 2009; Graziose et al., 2010; Leonti and Casu, 2013). Reports involving *Abrus precatorius*, *Datura* species, *Calotropis* species and other potentially toxic taxa require particular caution. Traditional use is hypothesis-generating evidence, not proof of safety or efficacy.

LIMITATIONS

The surviving archive lacks a final participant count, participant demographics, a locality-by-interview register, formal sampling probabilities, a complete participant-by-use matrix, a research-ethics approval identifier, participant-level consent records, a consolidated voucher catalogue, GPS-linked abundance data and standardised dose or outcome records. Therefore, use value, relative frequency of citation, fidelity level, informant consensus factor, sampling-sufficiency analysis and inferential statistics were not calculated. Therapeutic categories were coded from narrative wording and overlap substantially. Plant-part classes descr-

ibe plausible tissue-level harvesting pressure, not observed extraction intensity or demographic impact. Some names and family circumscriptions reflect the thesis and require voucher-based reconciliation. Findings are region- and period-specific and should not be generalised to all residents or communities of Jaipur district or Rajasthan.

CONCLUSIONS

This thesis-derived survey documents 121 medicinal taxa and a broad spectrum of traditional healthcare knowledge in Jaipur district. Fresh analysis confirms leaf predominance while showing that roots, rhizomes and whole plants account for nearly three-tenths of recorded part-use occurrences and deserve targeted conservation attention. Gastrointestinal, dermatological/oral/wound, metabolic/systemic and musculoskeletal/inflammatory indications were the most widely represented descriptive categories. These findings establish breadth, not clinical effectiveness or community consensus. The paper's principal contribution is a transparent regional inventory accompanied by explicit evidentiary limits. Its next scientific priorities are voucher recovery and nomenclatural verification, renewed consent-based sampling with complete participant-level records, species-specific harvest assessment, and cautious toxicological and pharmacological prioritisation.

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