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Ethnopharmacological Study: Documentation and Quantitative Analysis of Traditional Knowledge of Medicinal Plant Use by the Sasak Tribe in Lombok to Treat Digestive disorders

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ABSTRACT

The Sasak tribe possesses rich traditional knowledge of medicinal plants for digestive disorders, yet systematic documentation remains limited. This study documented and quantitatively analyzed medicinal plants used by Sasak traditional healers for gastrointestinal diseases through a cross-sectional ethnopharmacological survey involving 120 informants across five districts on Lombok Island. Data were collected using semi-structured interviews and analyzed using Use Value (UV), Relative Frequency of Citation (RFC), Fidelity Level (FL), and Informant Consensus Factor (FIC). A total of 20 plant species from 17 families were identified, with Curcuma longa, Zingiber officinale, and Psidium guajava being the most frequently cited. High informant consensus was found for diarrhea and dysentery (FIC = 0.978) and gastritis-related disorders (FIC = 0.977). Leaves and rhizomes were the most commonly used plant parts, while decoction was the primary preparation method. A strong positive correlation between UV and RFC ($r = 0.94$, $p < 0.001$) indicates a well-structured ethnopharmacological system with promising potential for further pharmacological validation. Conservation of this traditional knowledge is strongly recommended.

Keywords: *Ethnopharmacology, Sasak Tribe, Medicinal Plants, Digestive Disorders, Quantitative Ethnobotany, Lombok*

INTRODUCTION

Traditional medicine continues to serve as a cornerstone of primary healthcare in many developing nations, where an estimated 80% of the rural population relies on plant-based remedies for fundamental health needs (WHO, 2023). In the Indonesian archipelago, where more than 30,000 plant species have been recorded, ethnopharmacological knowledge is exceptionally diverse and often concentrated within specific ethnic communities whose healers have accumulated generations of empirical therapeutic knowledge (Riswan & Sangat-Roemantyo, 2021; Silalahi et al., 2022).

The Sasak people represent the dominant ethnic group of Lombok Island in West Nusa Tenggara Province, with a population exceeding 3.1 million (BPS-Statistics West Nusa Tenggara, 2023). The Sasak community maintains a distinct cultural identity that encompasses a rich tradition of traditional medicine deeply integrated with Islamic practices and local cosmology. Sasak traditional healers, known locally as *belian*, function as community health practitioners and spiritual guides, and their therapeutic knowledge spans centuries of practical application and oral transmission (Burhanuddin et al., 2022).

Digestive disorders constitute one of the most prevalent categories of illness in rural Lombok communities. Epidemiological data from the Provincial Health Office of West Nusa Tenggara indicate that diarrheal diseases, gastritis, dyspepsia, and intestinal parasitic infections collectively rank among the top five causes of outpatient visits in community health centers (*puskesmas*) across Lombok, accounting for approximately 23.7% of total visits in 2023 (Dinas Kesehatan NTB, 2023). Despite the availability of modern pharmaceuticals, a substantial proportion of the rural population continues to prefer botanical treatments for gastrointestinal complaints, citing accessibility, affordability, cultural acceptability, and perceived safety of plant-based remedies.

While several ethnobotanical surveys have documented Sasak traditional medicine in general terms (Purwanto et al., 2021; Hakim et al., 2022), dedicated quantitative analyses of plant knowledge specifically targeting digestive health indications remain sparse. The application of quantitative ethnobotanical indices including Use Report (UR), Relative Frequency of Citation (RFC), Use Value (UV), Fidelity Level (FL), and Informant Consensus Factor (FIC) enables rigorous scientific evaluation of community-held therapeutic knowledge and provides a replicable framework for identifying priority species for pharmacological investigation (Tardío & Pardo-de-Santayana, 2021; Kayani et al., 2022).

Critically, traditional ethnopharmacological knowledge is increasingly threatened by modernization, urbanization, land-use change, and the passing of elder knowledge-holders without adequate documentation a phenomenon termed *traditional ecological knowledge (TEK) erosion* or *ethnobotanical knowledge loss*. Several studies have demonstrated the rapid decline of plant knowledge in Indonesian communities over a single generation (Rahayu et al., 2022), underscoring the urgency of comprehensive documentation efforts. Furthermore, knowledge protection frameworks, including recognition under the Nagoya Protocol, require baseline documentation as a prerequisite for intellectual property and benefit-sharing arrangements.

The present study therefore aims to: (1) conduct a systematic ethnopharmacological survey of medicinal plants used by the Sasak community for digestive disorders; (2) apply quantitative ethnobotanical indices to assess the significance and consensus of documented plants; (3) explore the ecological and sociocultural dimensions of medicinal plant use; and (4) cross-reference findings with available phytochemical and pharmacological literature to identify species with high research priority.

METHODS

This study was conducted on Lombok Island (8°10'–8°55'S, 115°46'–116°40'E), which covers an area of approximately 4,725 km². Lombok is geographically divided into five administrative districts: North Lombok (Lombok Utara), Central Lombok (Lombok Tengah), East Lombok (Lombok Timur), West Lombok (Lombok Barat), and the city of Mataram. The island displays considerable ecological diversity, ranging from coastal lowlands to the slopes of Mount Rinjani (3,726 m a.s.l.), a UNESCO-designated Biosphere Reserve. Field sites were selected to encompass this ecological gradient, including lowland agricultural communities, forest-edge villages, highland settlements, and coastal fishing communities.

Climate on Lombok is characterized as tropical monsoon (Köppen classification Aw), with a wet season from November to March and a pronounced dry season from May to October. Annual rainfall ranges from 700 mm in the southern lowlands to over 2,500 mm on the northern slopes of Rinjani. The island harbors substantial plant biodiversity, including an estimated 1,400 native vascular plant species, approximately 340 of which have recorded ethnobotanical uses (Purwanto et al., 2021)

The study applied a purposive sampling strategy combined with snowball sampling to identify knowledgeable community members (Martin, 1995; Alexiades, 2022). Inclusion criteria for primary key informants were: (a) self-identification as a practitioner of traditional Sasak medicine; (b) minimum five years of active practice; (c) willingness to provide free, prior, and informed consent. The five-year minimum practice criterion was selected based on previous ethnopharmacological studies (e.g., Alexiades, 2022) to ensure informants had sufficient practical experience and had completed at least one full cycle of seasonal plant availability and associated disease patterns. Secondary informants were community members who used traditional plant remedies for digestive complaints but were not professional healers.

A total of 120 informants were recruited across the five study districts, comprising 45 *belian* (traditional healers), 35 herbalists, 25 community elders, and 15 village midwives. Age of informants ranged from 35 to 87 years (mean ± SD: 58.4 ± 12.7 years). Female informants represented 42.5% (n = 51) of the sample. The geographic distribution of informants was proportional to district population density (Table 1).

Table 1. Distribution of informants across study districts

District	Population (2023)	Belian	Herbal Medicine Seller	Elders	Midwives	Total
North Lombok	247,500	12	8	6	4	30
Central Lombok	860,000	11	9	7	3	30
East Lombok	1,105,000	10	7	6	4	27
West Lombok	750,000	7	6	4	2	19
Mataram City	450,000	5	5	2	2	14

Note: Distribution proportional to district population density.

Data collection was conducted between August 2024 and January 2025. A three-pronged data collection approach was employed. First, semi-structured interviews using a pre-tested questionnaire elicited information on plant names (in Sasak, Indonesian, and any other local nomenclature), plant parts used, methods of preparation, dosage and administration, conditions treated, perceived efficacy, contraindications, and the source of knowledge acquisition. All interviews were conducted in the Sasak or Indonesian language by trained local field assistants who were native Sasak speakers. Second, direct participant observation was conducted in household gardens, communal medicine stores, and during community health rituals to verify and supplement interview data. Third, plant specimens were collected with informant guidance, and voucher specimens were prepared following standard herbarium protocols. Voucher specimens were deposited at the Herbarium of the Faculty of Mathematics and Natural Sciences, Universitas Mataram (HMNS-UM), with the following accession numbers: *Curcuma longa* (HMNS-UM 2024/001), *Zingiber officinale* (HMNS-UM 2024/002), *Psidium guajava* (HMNS-UM 2024/003), and subsequent accessions sequentially assigned (HMNS-UM 2024/004 to HMNS-UM 2024/020). Botanical identification was confirmed by plant taxonomists at Universitas Mataram and cross-referenced with the Plants of the World Online database (POWO, 2024).

The quantitative ethnobotanical indices were calculated following established methodologies (Tardío & Pardo-de-Santayana, 2021; Trotter & Logan, 2021).

Use Report (UR) was defined as the total number of informants reporting the use of a particular plant species for digestive disorders.

Relative Frequency of Citation (RFC) was calculated using the formula:

$$RFC = FC / N$$

where FC represents the number of informants citing a plant species and N is the total number of informants (N = 120), with values ranging from 0 to 1.

Use Value (UV) was determined using:

$$UV = \Sigma U / N$$

where U is the number of use reports mentioned by each informant for a given species, indicating the relative importance and usefulness of the plant.

Fidelity Level (FL) was calculated as:

$$FL\ (\%) = (Ip / Iu) \times 100$$

where I_p refers to the number of informants citing a plant for its primary therapeutic use and I_u represents the total number of informants mentioning the plant for any use.

Informant Consensus Factor (FIC) was calculated using:

$$FIC = (Nur - Nt) / (Nur - 1)$$

where N_{ur} is the total number of use-citations for a particular ailment category and N_t is the number of plant species used for that category. FIC values approaching 1.0 indicate a high level of agreement among informants regarding plant use for specific diseases.

Ethical approval was obtained from the Research Ethics Committee of Universitas Mataram (Approval No. 072/UN18.L1/PP/2024). All informants provided written free, prior, and informed consent prior to participation. Community-level consent was also obtained through village headmen (*kepala desa*) and customary councils (*adat councils*). Cultural sensitivity protocols were observed, including recognition of sacred plants and healing rituals that were not to be documented publicly. Data were anonymized, and informants were assigned coded identifiers throughout analysis.

Descriptive statistics (means, standard deviations, frequencies) were computed using IBM SPSS Statistics version 29.0 (IBM Corp., Armonk, NY, USA). Pearson's correlation coefficient was used to assess the relationship between RFC and UV. Inter-informant agreement was assessed using Fleiss' Kappa statistic. Plant family diversity was analyzed using the Shannon-Wiener diversity index (H'). A p-value < 0.001 was considered statistically significant.

RESULTS

1. Sociodemographic Characteristics of Informants

The 120 informants included participants from all five districts of Lombok. The mean age of key informants (*belian*) was 63.2 ± 10.4 years, indicating that elder knowledge-holders remain the primary custodians of this botanical heritage. A significant gender imbalance was observed in the *belian* category, where 78% were male, reflecting traditional Sasak gender norms for healing practices. However, the *tukang jamu* (herbalist) category showed female predominance (68.6%). Educational attainment was generally low, with 71.7% of key informants reporting only primary school completion or no formal education. Knowledge acquisition was predominantly reported as intergenerational (familial) transmission (64.2%), followed by apprenticeship to a senior *belian* (24.1%) and self-learning through experimentation (11.7%).

Inter-informant consensus was high, with a Fleiss' Kappa of 0.76 (substantial agreement) across all plant-condition pairs. This level of agreement validates the ethnobotanical data as representative of community-held knowledge rather than idiosyncratic individual practice.

2. Documented Medicinal Plant Species

A total of 20 medicinal plant species belonging to 17 families were documented (Table 2). The family Zingiberaceae was the most represented, contributing four species (*Curcuma longa*, *Zingiber officinale*, *Curcuma xanthorrhiza*, and *Kaempferia galanga*), which collectively accounted for 32.1% of all use-citations. This dominance of Zingiberaceae reflects its well-established pharmacological profile for gastrointestinal applications. Apiaceae contributed two species (*Centella asiatica* and *Foeniculum vulgare*), while all other families contributed a single species each. Plant species originated predominantly from cultivated home gardens (55%), followed by semi-wild or ruderal habitats (30%), and managed forest edges (15%).

Plant parts used were categorized into: leaf (35%), rhizome (30%), fruit (15%), bark (8%), seed (6%), gel (4%), and whole herb (2%). Leaves and rhizomes together accounted for 65% of all plant parts referenced. Preparation methods included boiling/decoction (58.4%), grating and squeezing (fresh juice) (18.7%), raw consumption (12.3%), chewing (6.2%), and ground paste application (4.4%). The predominance of aqueous decoction as a preparation method is consistent with broader patterns in Indonesian ethnomedicine and is pharmacologically significant as it facilitates the extraction of water-soluble bioactive phytochemicals.

Table 2. Medicinal plant species documented for digestive disorders in the Sasak community, Lombok (n = 120 informants)

No.	Local Name	Scientific Name	Family	Part Used	Preparation	Ailment Treated	FC
1	Bilong-bilong	*Centella asiatica (L.) Urb.*	Apiaceae	Leaf	Boiled decoction	Bloating, indigestion	78
2	Turmeric	*Curcuma longa L.*	Zingiberaceae	Rhizome	Grated + squeezed	Gastritis, nausea	98
3	Ginger	*Zingiber officinale Roscoe*	Zingiberaceae	Rhizome	Boiled decoction	Nausea, diarrhea	92
4	Cinnamon	*Cinnamomum verum J.Presl*	Lauraceae	Bark	Boiled decoction	Dyspepsia, flatulence	51
5	Sambiloto	*Andrographis paniculata (Burm.f.) Nees*	Acanthaceae	Leaf	Decoction/direct chew	Diarrhea, dysentery	82

6	Pawpaw	*Carica papaya L.*	Caricaceae	Leaf, unripe fruit	Raw juice	Constipation, indigestion	74
7	Curcuma	*Curcuma xanthorrhiza Roxb.*	Zingiberaceae	Rhizome	Grated decoction	Liver disorders, dyspepsia	71
8	Aromatic ginger	*Kaempferia galanga L.*	Zingiberaceae	Rhizome	Ground paste	Bloating, colic pain	64
9	Aloe vera	*Aloe vera (L.) Burm.f.*	Asphodelaceae	Leaf gel	Raw gel consumption	Gastric ulcer, constipation	68
10	Guava	*Psidium guajava L.*	Myrtaceae	Leaf	Decoction	Diarrhea, dysentery	87
11	Noni	*Morinda citrifolia L.*	Rubiaceae	Fruit	Juice	Gastric pain, constipation	59
12	Betel nut	*Areca catechu L.*	Arecaceae	Seed	Chewed/boiled	Intestinal parasites	44
13	Starfruit	*Averrhoa bilimbi L.*	Oxalidaceae	Fruit	Raw consumption	Digestive stimulant	35
14	Sauropus androgynus leaves	*Sauropus androgynus (L.) Merr.*	Phyllanthaceae	Leaf	Cooked (vegetable)	Constipation	28
15	Betel	*Piper betle L.*	Piperaceae	Leaf	Chewed/decoction	Bloating, flatulence	55
16	White turmeric	*Curcuma zedoaria (Christm.) Roscoe*	Zingiberaceae	Rhizome	Boiled decoction	Gastritis, peptic disorders	32
17	Make sure the buffalo	*Euphorbia hirta L.*	Euphorbiaceae	Whole herb	Decoction	Diarrhea, dysentery	39
18	Liman footprint	*Elephantopus scaber L.*	Asteraceae	Leaf	Decoction	Dyspepsia, liver complaints	26
19	Randu	*Ceiba pentandra (L.) Gaertn.*	Malvaceae	Bark	Decoction	Diarrhea	23

20	Fennel	*Foeniculum vulgare Mill.*	Apiaceae	Seed	Boiled decoction	Flatulence, colic	48

Note: FC = Frequency of Citation; all species were botanically verified and voucher specimens deposited at HMNS-UM.

3. Quantitative Ethnobotanical Indices

Curcuma longa L. (kunyit; turmeric) emerged as the most significant medicinal plant by all quantitative measures, with the highest frequency of citation (FC = 98 of 120 informants), highest RFC (0.817), and highest UV (1.63). *Zingiber officinale* Roscoe (jahe; ginger) ranked second (RFC = 0.767, UV = 1.44), primarily cited for nausea, vomiting, and diarrhea. *Psidium guajava* L. (jambu biji; guava) ranked third (RFC = 0.725, UV = 1.28) and was cited most consistently for acute diarrhea.

A highly significant positive correlation was observed between RFC and UV (Pearson's $r = 0.94$, $p < 0.001$), indicating that plants cited more frequently by informants also tend to have more diverse reported uses, a pattern consistent with culturally well-embedded multipurpose plants. Shannon-Wiener diversity index for plant families yielded $H' = 2.74$, indicating substantial family-level diversity in the medicinal flora documented.

Table 3. Quantitative ethnobotanical indices for the 15 most cited medicinal plants

Scientific Name	FC (n=120)	UR (%)	FL (%)	RFC	UV
Curcuma longa L.	98	81.67	79.59	0.817	1.63
Zingiber officinale Roscoe	92	76.67	78.26	0.767	1.44
Psidium guajava L.	87	72.50	75.86	0.725	1.28
Andrographis paniculata (Burm.f.) Nees	82	68.33	73.17	0.683	1.19
Centella asiatica (L.) Urb.	78	65.00	69.23	0.650	1.12
Carica papaya L.	74	61.67	66.22	0.617	1.03
Curcuma xanthorrhiza Roxb.	71	59.17	53.10	0.592	0.98
Aloe vera (L.) Burm.f.	68	56.67	50.30	0.567	0.92
Kaempferia galanga L.	64	53.33	47.90	0.533	0.85

Morinda citrifolia L.	59	49.17	43.60	0.492	0.78
Piper betle L.	55	45.83	40.20	0.458	0.71
Cinnamomum verum J.Presl	51	42.50	36.80	0.425	0.65
Foeniculum vulgare Mill.	48	40.00	34.50	0.400	0.62
Areca catechu L.	44	36.67	31.20	0.367	0.54
Euphorbia hirta L.	39	32.50	27.80	0.325	0.48

Note: FC = Frequency of Citation; UR = Use Report (%); FL = Fidelity Level (%); RFC = Relative Frequency of Citation; UV = Use Value. N = 120.

4. Informant Consensus Factor (FIC) by Ailment Category

The Informant Consensus Factor results are presented in Table 4. All nine digestive disorder categories achieved FIC values ≥ 0.969, indicating consistently very high levels of inter-informant consensus across all ailment groups. Diarrhea and dysentery exhibited the highest FIC (0.978), reflecting strong community agreement on the botanical treatment of these acute conditions. Gastritis and peptic disorders achieved the second-highest FIC (0.977), with a limited but highly agreed-upon set of plants principally cited consistently

The remarkably high FIC values across all ailment categories (mean FIC = 0.973) collectively indicate a cohesive and well-consolidated traditional pharmacopoeia for digestive health in the Sasak community. This level of consensus substantially increases the scientific credibility of the documented plant-use relationships and provides strong justification for prioritizing these species in pharmacological validation studies.

Table 4. Informant Consensus Factor (FIC) by digestive disorder ailment category

Ailment Category	No. Plants (Nt)	Use-Citations (Nur)	FIC	Interpretation
Diarrhea & Dysentery	8	312	0.978	Very High Consensus
Gastritis & Peptic Disorders	7	268	0.977	Very High Consensus
Bloating & Flatulence	6	198	0.975	Very High Consensus
Nausea & Vomiting	5	152	0.974	Very High Consensus
Constipation	5	141	0.971	Very High Consensus

Indigestion & Dyspepsia	7	226	0.973	Very High Consensus
Intestinal Parasites	3	78	0.974	Very High Consensus
Liver & Hepatic Disorders	4	97	0.969	High Consensus
Colic & Abdominal Pain	4	104	0.971	Very High Consensus

Note: Nt = number of plant taxa used; Nur = number of use-citations; FIC > 0.90 considered high consensus.

5. Fidelity Level of Priority Species

Curcuma longa achieved the highest FL (79.59%), with 78 of 98 informants who cited it identifying gastritis/peptic pain as its primary indication. *Zingiber officinale* exhibited FL of 78.26% (primary use: nausea and diarrhea). These high FL values confirm that these species are strongly associated with specific therapeutic roles in Sasak medicine and are not merely generalist herbs used indiscriminately. *Andrographis paniculata* (sambiloto) showed FL of 73.17%, with strong primary association with acute diarrhea and dysentery an indication well-supported by its documented andrographolide content and anti-secretory properties (Hossain et al., 2022).

DISCUSSION

The predominance of *Curcuma longa* L. in this survey is consistent with its extensive documentation across Southeast Asian ethnomedicinal traditions. The primary active constituent, curcumin, has demonstrated anti-inflammatory, antioxidant, anti-ulcer, and choleretic activities in numerous *in vitro* and *in vivo* studies (Rajasekaran et al., 2022; Shen et al., 2022). Clinical studies have demonstrated curcumin's efficacy in reducing symptoms of dyspepsia and gastritis comparable to prokinetic agents (Khayat et al., 2021). The Sasak preparation of turmeri typically grating the fresh rhizome and squeezing out the juice, sometimes combined with palm sugar and lime may enhance bioavailability of curcuminoids, though formal bioaccessibility studies of this traditional preparation method are lacking and represent an important research gap.

Zingiber officinale (ginger) holds high positions in both RFC and UV rankings and is used across cultures globally for nausea, vomiting, and diarrhea. Its pharmacological basis lies principally in the phenolic compounds gingerols and shogaols, which modulate 5-HT_3 and NK_1 receptors to exert antiemetic effects, and inhibit prostaglandin synthesis to reduce intestinal cramping and diarrhea (Mahboubi, 2021; Lete & Allué, 2022). The Sasak practice of combining ginger decoctions with palm sugar and salt to treat acute diarrhea reflects an empirical oral rehydration strategy that merits formal evaluation.

Psidium guajava (guava leaf) ranked third in our study, used primarily for acute diarrhea and dysentery. Guava leaves are rich in quercetin, which inhibits intestinal smooth muscle contractility and reduces fluid secretion in the gut (Morales et al., 2021). A meta-analysis by Ohaeri et al. (2022)

concluded that guava leaf extracts significantly reduced the duration of diarrhea in clinical settings, validating its widespread ethnomedicinal use. The Sasak application typically five to seven young leaves boiled in water and consumed as a decoction is consistent with preparations documented elsewhere in Indonesia and the Philippines.

Andrographis paniculata (sambiloto), the fourth-ranked plant, is a well-documented antidiarrheal and anti-dysenteric herb in Ayurvedic and Southeast Asian medicine. Its primary bioactive constituent, andrographolide, has demonstrated antimicrobial activity against *Escherichia coli*, *Shigella* spp., and *Campylobacter jejuni* key pathogens implicated in infectious diarrhea and dysentery in tropical settings (Hossain et al., 2022).

High FIC values (≥ 0.969) across all ailment categories in this study suggest that Sasak traditional knowledge for digestive disorders represents a well-developed, empirically refined therapeutic system rather than isolated idiosyncratic practices. In pharmacological terms, high-consensus plant-indication pairs should logically receive priority in preclinical and clinical investigation pipelines (Trotter & Logan, 2021).

Cross-cultural validation further strengthens the scientific credibility of the documented ethnopharmacological knowledge. Seven of the 20 documented species including *Curcuma longa*, *Zingiber officinale*, *Psidium guajava*, *Andrographis paniculata*, *Centella asiatica*, *Aloe vera*, and *Morinda citrifolia* have been independently documented for similar gastrointestinal applications in other Southeast Asian and broader ethnomedicinal traditions (Kayani et al., 2022; Silalahi et al., 2022), substantially reducing the probability of coincidental associations.

The predominance of aqueous decoction (58.4% of preparations) has important biopharmaceutical implications. Boiling plant material in water selectively extracts hydrophilic compounds including polysaccharides, tannins, flavonoid glycosides, alkaloids, and saponins many of which are relevant to gastrointestinal pharmacology. The Sasak knowledge of which plants require boiling versus raw consumption versus fresh juice preparation may reflect implicit empirical understanding of preparation-dependent bioactivity.

Approximately 43% of informants described using multiple plant species simultaneously for a single complaint combinations termed *ramuan* in Sasak traditional medicine. The most common combinations included *Curcuma longa* with *Zingiber officinale* and *Kaempferia galanga* for gastritis, and *Psidium guajava* with *Andrographis paniculata* for dysentery. Such poly-herbal combinations may exhibit synergistic or additive pharmacological effects, but may also present risks of pharmacokinetic interactions that have not been systematically investigated.

A critical finding of qualitative interviews was the widespread recognition among Sasak *belian* that traditional plant knowledge is eroding. Several senior healers (age > 70 years) reported that they had no willing apprentices, and that younger community members prefer pharmaceutical drug treatment for acute conditions. This observation is consistent with broader trends documented across Indonesia (Rahayu et al., 2022).

Plant availability is a secondary but significant conservation concern. Several species with high cultural significance, including *Morinda citrifolia* and *Elephantopus scaber*, were reported by

informants to be declining in local abundance due to habitat conversion. Community-based medicinal plant gardens (*kebun tanaman obat keluarga* TOGA) were noted by only 12.5% of informants as active knowledge-preservation initiatives. A comprehensive ethnobotanical conservation strategy, including *in situ* and *ex situ* plant conservation, traditional knowledge documentation under the Nagoya Protocol, and community-based participatory conservation programs, is urgently warranted.

CONCLUSIONS

This study provides the first comprehensive, quantitatively analyzed ethnopharmacological documentation of medicinal plants used by the Sasak tribe of Lombok for digestive disorders. A total of 20 plant species across 17 families were identified, with Zingiberaceae representing the dominant family.

Curcuma longa, *Zingiber officinale*, *Psidium guajava*, and *Andrographis paniculata* emerged as the highest-priority species based on RFC, UV, FL, and FIC metrics. Consistently very high FIC values (mean 0.973) across all ailment categories attest to the coherence, reproducibility, and scientific credibility of the Sasak traditional gastrointestinal pharmacopoeia.

The quantitative indices applied in this study provide an objective, reproducible, and culture-sensitive framework for identifying plant-indication pairs that are most deserving of preclinical and clinical pharmacological investigation. In particular, the poly-herbal formulations (*ramuan*) described by informants represent unexplored territory for combinatorial pharmacology research. The study also underscores the critical and urgent need for traditional knowledge documentation, community-based conservation, and intellectual property protection within the Nagoya Protocol framework.

Future work should prioritize: (1) phytochemical profiling and standardization of high-RFC species; (2) in vitro and in vivo pharmacological validation of anti-diarrheal, anti-ulcer, and prokinetic activities; (3) safety and toxicological assessment of traditional preparations; (4) biopharmaceutical characterization of traditional preparation methods; and (5) clinical pilot studies for the most promising plant-indication pairs. Collaborative research partnerships between academic institutions, the Indonesian Ministry of Health, and Sasak traditional healer communities are essential to ensure that this valuable traditional knowledge is translated into evidence-based, culturally appropriate health interventions.

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