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Exploration and Inventory of Ethnobotanical Knowledge of Medicinal Plants in Ternate: Tracing the Traditional Pharmacy Heritage of the Spice Islands

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Abstract: The ethnobotanical wisdom of the Ternate community represents a rich heritage of traditional healing practices that are deeply rooted in the interaction between people and nature. However, the modernization of the healthcare system and cultural shifts have increasingly threatened the continuity of this indigenous knowledge. This study aimed to explore and inventory the ethnobotanical knowledge of medicinal plants traditionally used in the Ternate region as part of an effort to preserve the traditional pharmacy legacy of the Spice Islands. Data were collected through field-observations, semi-structured interviews with traditional healers, local residents, and plant specimen documentation. A purposive sample of 29 traditional healers was recruited for this study, based on their presumed expertise in medicinal plant knowledge. The study identified 70 medicinal plant species belonging to 40 families, which are empirically used to treat common ailments such as fever, digestive disorders, wounds, insomnia, diabetes mellitus, and urinary stones. Leaves were the most frequently used plant part (approximately 64%) followed by roots and barks, with decocting being the dominant preparation method. Several endemic species have demonstrated pharmacological potential, consistent with findings in contemporary scientific literature, indicating promising opportunities for bioprospecting. This research highlights that preserving ethnobotanical knowledge is not merely a cultural duty but also a scientific imperative for sustainable natural product development rooted in Ternate's local wisdom.

Keywords: *ethnobotany, exploration, medicinal plants, ternate, traditional pharmacy heritage*

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1. INTRODUCTION

Ethnobotany is a multidisciplinary field that examines the dynamic interactions between humans and plants, particularly in the context of cultural practices, traditional knowledge, and daily life. This discipline extends beyond the taxonomic identification or botanical description of plant species, encompassing the social, cultural, and symbolic dimensions of how communities perceive and utilize plant resources. Ethnobotanical studies highlight the integral role of plants not only as sources of medicine and food but also as elements that sustain local traditions and ecological balance (Pandey and Tripathi, 2017).

In Indonesia, traditional ethnic communities possess distinct cultural identities and well-defined systems of values that guide their relationship with nature (Iskandar, 2012). Their culture can be viewed as a comprehensive body of knowledge, norms, and adaptive strategies developed to sustain life and preserve the surrounding environment. In managing and utilizing natural resources, local communities depend on inherited wisdom, belief systems, and worldviews that emphasize harmony and sustainability. This adaptive orientation reflects their deep ecological awareness and contributes to the long-term conservation of biodiversity.

The use of medicinal plants has long been an integral part of Indonesia's cultural heritage, transmitted across generations through empirical knowledge and local practices. In Ternate, the community continues to rely on ancestral wisdom in utilizing plants as natural remedies (Lesmana *et al.*, 2018). The popularity of traditional medicine has increased since the COVID-19 pandemic, driven by its affordability, accessibility, and the perception that herbal remedies are safer than synthetic pharmaceuticals.

Ternate Island has long been recognized as a fertile region for the growth of various spices and medicinal plants, particularly cloves, nutmeg, and other aromatic species. According to Sunarti (2011), approximately 42 medicinal plant species have been recorded on the island. In Moti District, Ternate City, several of these plants are traditionally used to treat postpartum conditions, sciatica, measles, hypertension, malaria, fever, cough, toothache, and urinary disorders. Data from the Directorate General of Village Community Empowerment (2007) indicate that residents in this region cultivate medicinal plants such as ginger (*Zingiber officinale*), turmeric (*Curcuma longa*), galangal (*Alpinia galanga*), cat's whiskers (*Orthosiphon aristatus*), cinnamon (*Cinnamomum verum*), and betel nut (*Areca catechu*).

However, in recent years, the use of medicinal plants in everyday healthcare has declined, as communities increasingly depend on modern pharmaceuticals prescribed by physicians. This shift has contributed to the gradual loss of traditional knowledge, threatening the preservation of ethnomedicinal practices that once played a vital role in community health and cultural identity. Given this condition, a systematic ethnobotanical study is essential to document, investigate, and preserve traditional medicinal knowledge in Ternate. This research seeks not only to record the diversity of medicinal plants but also to understand the cultural context of their use. Through this approach, the study aims to bridge traditional wisdom and modern scientific perspectives, providing a foundation for future pharmacological studies and biodiversity conservation.

Previous ethnobotanical studies in Ternate have largely concentrated on the documentation of medicinal plant species and their uses within limited geographical settings, typically focusing on one or two villages. While these localized studies have provided important baseline information, their restricted spatial scope limits a comprehensive understanding of ethnobotanical knowledge distribution across the city. In contrast, this study expands the geographical coverage by investigating seven villages in Ternate city, namely Foramadiahi, Salahuddin, Tubo, Tarau, Moya, Ngade, and Fitu. This broader spatial approach enables a more representative assessment of traditional pharmacy heritage across diverse socio-cultural and environmental contexts. This research addresses these gaps by integrating a multi-village ethnobotanical survey with an analysis of traditional pharmacy heritage, allowing for comparative insights across a wider territorial scale.

2. MATERIAL AND METHOD

2.1 Study Area

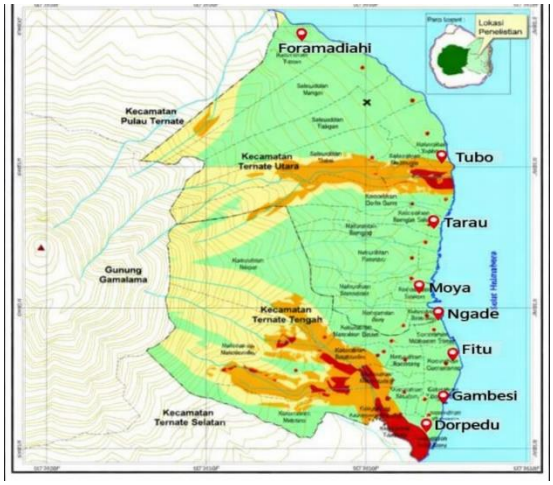

Figure 1. Map of the study area in Ternate City (source: google.com/maps/ternate)

This research was conducted in seven villages within Ternate City, North Maluku Province, namely Foramadiahi, Salahudin, Tubo, Tarau, Moya, Ngade, and Fitu. These areas were selected because of their rich biodiversity and the strong presence of traditional knowledge related to medicinal plant use among local communities. Fieldwork was carried out in January 2023.

2.2 Tools and Materials

The tools used in this study included writing instruments (pens and field data sheets) for note-taking, a mobile phone for photo documentation, and the Google Lens application to assist in identifying the scientific (Latin) names of plant species. The materials used consisted of a set of semi-structured questionnaires developed for interviews with selected informants.

2.3 Methods

The research procedure comprised two main stages:

1. Preliminary Survey
   A preliminary survey was conducted to determine the study sites and identify key informants, such as traditional healers, herbal practitioners, and elderly community members possessing ethnobotanical knowledge. This stage also involved initial observations of local flora and plant utilization patterns.
2. Data Collection through Interviews
   Primary data were obtained through direct, face-to-face interviews using semi-structured questionnaires. Interviews were aimed at gathering information regarding the local names of plants, their medicinal uses, plant parts utilized, preparation methods, routes of administration, and perceived therapeutic effects. Each informant's consent was obtained prior to participation, and interviews were conducted in the local language when appropriate to ensure clarity and cultural sensitivity.

2.4 Data Analysis

Data were analyzed descriptively by categorizing the collected information according to plant species, families, uses, and modes of preparation. Plant species identified during the study were cross-checked using botanical references and verified for their accepted scientific names. The frequency of use and cultural significance of each plant were assessed to highlight the most commonly utilized species in traditional medicine within the Ternate region.

3. RESULTS AND DISCUSSION

3.1 Demographic Feature of the Informants

Table 1. Occupational category of the Participants

Occupation	N	Percentage (%)
Unemployed	3	10
NGO member	1	4
Housewife	9	31
Farmer	12	41
Civil servant	3	10
Driver	1	4

Note: N = Number of participants

A total of 29 informants participated in this ethnobotanical study, representing diverse demographic backgrounds across the surveyed in Ternate. The informants consisted of men (55%) and women (45%), with ages ranging from 65-80 years (majority) who are recognized as custodians of traditional knowledge. In term of occupation, the informants included farmers, housewives, NGO members, civil servants, and drivers, many of whom possess experience in utilizing medicinal plants for household

healthcare practices. Traditional healers (dukun or tabib) formed a particularly important subgroup, as they provided more detailed insight into plant identification, preparation methods, and cultural beliefs associated with medicinal plant use.

The educational background of the informants varied, ranging from elementary school (35%), junior high school (35%), senior high school (20%), diploma (7%), and from university (3%). Despite differences in formal education, all informants demonstrated a strong familiarity with local resources and their medicinal applications, indicating traditional knowledge in Ternate is primarily transmitted orally and experientially rather than through formal schooling.

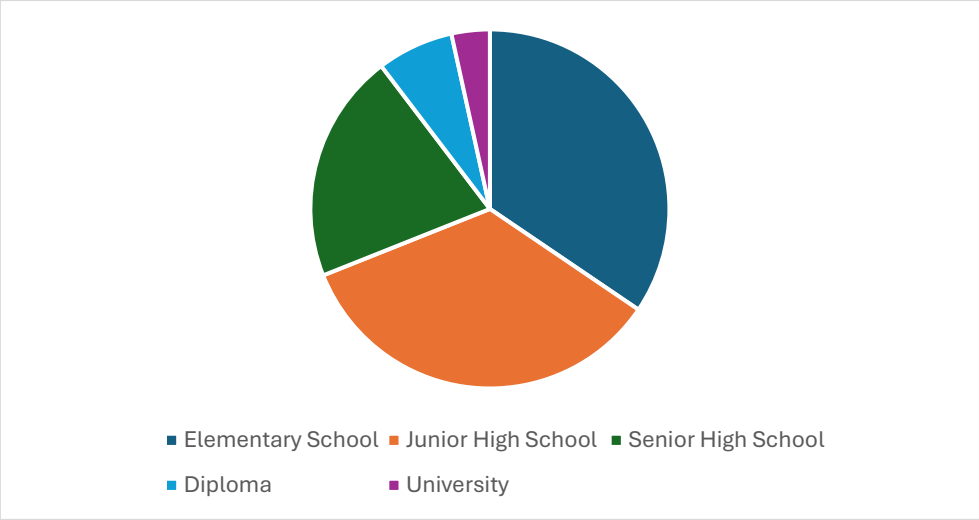

Figure 2. Education Level of Participants

Overall, the demographic profile of the informants highlights the essential role of age, occupation, and cultural experience in shaping the distribution of ethnobotanical knowledge in Ternate, providing a reliable foundation for documenting traditional medicinal plant practices in the region.

3.2 Medicinal Plants and Related Knowledge

Communities in Ternate possess long-standing knowledge systems related to the management and utilization of natural resources, particularly medicinal plants. Traditional healers (Tabib) play an essential role in maintaining ethnobotanical practices, especially in maternal care, child health, and the treatment of common ailments. The highest proportion of healers was recorded in Moya and Foramadiahi (17.24% each), where strong kinship networks support the intergenerational transmission of plant-based medicinal knowledge (BPS, 2020). In these areas, medicinal plants are still widely cultivated in home gardens, reflecting ongoing community engagement with traditional pharmacopoeia.In contrast, the lowest proportion of healers was observed in Salahudin (3.44%), where high population density, limited household land, and easy access to modern healthcare facilities have reduced community reliance on herbal medicine. As a result, traditional knowledge has gradually declined due to limited cultural transmission and an increasing preference for conventional pharmaceutical (WHO, 2023).

The ethnobotanical survey was conducted across several villages including Foramadiahi, Kastela, and Tubo. Foramadiahi historically the earliest center of the Ternate Sultanate has a strong cultural identity, with traditional governance structures such as the fangira maintaining sociocultural continuity. The area is bordered by well preserved forest land spanning approximately 400 hectares. Tubo, formerly led by traditional fugures (momole and fanyira), evolved into a formal administrative village and was officially designed as Kelurahan Tubo in 2007 year (BPS, 2020). Despite modernization, many residents of Ternate continue to rely on traditional medicine alongside over the counter drugs and clinical health

service. When seeking plant-based remedies, community members often consult local healers, who are regarded as custodians of medicinal plant knowledge. Their role remains particularly important for woman during pregnancy and childbirth, as well as families with infants and young children, emphasizing the continued relevance of traditional healthcare within Ternate's socioecological landscape (Heinrich et al, 2009).

3.3 Medicinal plant species identified in Ternate area according to ethbotanical interviews

In this ethnomedicinal survey, a total of 70 plant species were documented as medicinal plants in Ternate city. The plant families, scientific names, along with the plant habit of growth, local names are presented in Table 2.

Table 2. Medicinal plant species recorded in Ternate region based on informant interviews

No	Local Name	Scientific Name	Family	Cultivation Status	Habit of growth
1	Amo	*Artocarpus communis*	Moraceae	Semi cultivation	Tree
2	Bangle	*Zingiber purpureum*	Zingiberaceae	Cultivation	Bush
3	Bawang putih	*Allium sativum*	Alliaceae	Cultivation	Herb
4	Bido-bido	*Piper aduncum*	Piperaceae	Semi cultivation	Herb
5	Binahong	*Anredera cordifolia*	Basellaceae	Cultivation	Bush
6	Blakang babiji	*Phylantus neruri*	Euphorbiaceae	Wild Plants	Herb
7	Brotowali	*Tinospora crispa*	Menispermaceae	Cultivation	Herb
8	Buah Yakis	*Anacardium occidentale*	Anacardiaceae	Semi cultivation	Tree
9	Bunga biru	*Stachytarpheta mutabilis*	Verbenaceae	Wild Plants	Herb
10	Bunga laka	*Impatiens balsamina*	Balsaminaceae	Semi cultivation	Herb
11	Bunga kista	*Mentha arvensis*	Lamiaceae	Cultivation	Herb
12	Cengkeh	*Syzygium aromaticum*	Myrtaceae	Semi cultivation	Tree
13	Daun jati sanang	*Gynura procumbens*	Asteraceae	Cultivation	Shrub
14	Daun mangkok	*Polyscias scutellaria*	Araliaceae	Cultivation	Shrub
15	Daun pel	*Ocimum basilicum*	Lamiaceae	Semi cultivation	Herb
16	Daun tiga	*Peperomia pellucida*	Piperaceae	Cultivation	Herb
17	Degi	*Abelmoschus manihot*	Malvaceae	Cultivation	herb
18	Duku	*Lansium domesticum*	Meliaceae	Cultivation	Tree
19	Gamira	*Macaranga involucrate*	Euphorbiaceae	Wild Plants	Shrub
20	Grama kusu	*Cymbopogon nardus*	Poaceae	Cultivation	Bush
21	Giyawas	*Psidium guajava*	Myrtaceae	Semi cultivation	Tree
22	Guraka	*Zingiber officinale*	Zingiberaceae	Cultivation	Herb
23	Jarak pagar	*Jatropa curcas*	Euphorbiaceae	Wild Plants	Bush
24	Jeruk nipis	*Citrus aurantifolia*	Rutaceae	Cultivation	Bush
25	Kaltoda	*Laportea decumana*	Urticaceae	Wild Plants	Herb
26	Kayu manis	*Cinnamomum burmanii*	Lauraceae	Wild Plants	Tree
27	Kelapa	*Cocos nucifera*	Arecaceae	Cultivation	Tree
28	Kembang sepatu	*Hibiscus rosa sinensis*	Malvaceae	Cultivation	Shrub
29	Ketapang	*Terminalia katapa*	Combretaceae	Cultivation	Tree
30	Kabi-kabi	*Bryophyllum pinnatum*	Crassulaceae	Cultivation	Bush
31	Kabi merah	*Graptophyllum*	Acantaceae	Cultivation	Bush

No	Local Name	Scientific Name	Family	Cultivation Status	Habit of growth
32	Kabi putih	*Pictum Graptophyllum*	Acantaceae	Cultivation	Bush
33	Konfifi	*Blumea balsamifera*	Asteraceae	Cultivation	Herb
34	Daun afrika	*Vermonia balsamifera*	Asteraceae	Cultivation	Herb
35	Kusu-kusu	*Imperata cylindrical*	Poaceae	Wild Plants	Bush
36	Kumis kucing	*Orthosiphon aristatus*	Lamiaceae	Semi cultivation	Herb
37	Bidara	*Ziziphus jujuba Mill*	Rhamnaceae	Semi cultivation	Herb
38	Leka-leka	*Zingiber purpureum*	Zingiberaceae	Cultivation	Bush
39	Lengkuas	*Alpinia galanga*	Zingiberaceae	Semi cultivation	Shrub
40	Loloro	*Ipomoea pes-caprae*	Convolvulaceae	Cultivation	Herb
41	Langsa	*Lansium domesticum*	Meliaceae	Wild Plants	Tree
42	Mangga	*Mangifera indica*	Anacardiaceae	Cultivation	Tree
43	Mangga dodol	*Mangifera spp.*	Anacardiaceae	Cultivation	Tree
44	Mahkota dewa	*Phaleria macrocarpa*	Thymeleacea	Cultivation	Shrub
45	Mayana bunga	*Coleus scutellarioides*	Lamiaceae	Cultivation	Herb
46	Mengkudu	*Morinda citrifolia*	Rubiaceae	Semi cultivation	Tree
47	Puring	*Strobilanthes crispus*	Euphorbiaceae	Cultivation	Shrub
48	Luri masoro	*Laportea aestuans*	Urticaceae	Wild Plants	Herb
49	Nanas	*Ananas comosus*	Bromeliaceae	Cultivation	Herb
50	Nampu	*Homalomena occulta*	Araceae	Cultivation	Herb
51	Cocor bebek	*Kalanchoe pinnata*	Crassulaceae	Cultivation	Shrub
52	Keladi tikus	*Thyphonium flagelliforme*	Araceae	Wild Plants	Vine
53	Pagoda	*Clerodendrum japonicum*	Verbenaceae	Wild Plants	Bush
54	Pala	*Myristica fragrans*	Myristicaceae	Semi cultivation	Tree
55	Papaceda	*Scaevola taccada*	Goodeniaceae	Semi cultivation	Shrub
56	Papaya	*Carica papaya*	Caricaceae	Semi cultivation	Tree
57	Pare	*Momordica charantia*	Cucurbitaceae	Cultivation	vine
58	Pecah beling	*Strobilanthes crispus*	Acantaceae	Cultivation	Bush
59	Pinang	*Areca catechu*	Arecaceae	Semi cultivation	Tree
60	Rai-rai	*Cyanthula prostrata*	Amaranthaceae	Cultivation	Herb
61	Mangrove	*Rhizophora spp.*	Rhizoporaceae	Cultivation	Tree
62	Sirih	*Piper betle*	Piperaceae	Cultivation	vine
63	Sirih hutan	*Piper caducibracteum*	Piperaceae	Wild Plants	vine
64	Sirsak	*Anona muricata*	Anonaceae	Cultivation	Shrub
65	Tebu merah	*Saccharum spp.*	Poaceae	Cultivation	Shrub
66	Tagalolo	*Ficus septica*	Moraceae	Semi cultivation	Shrub
67	Tagameme	*Cardiospermum halicacabum*	Sapindaceae	Cultivation	Herb
68	Torota	*Diplazium esculentum*	Athyriaceae	Wild Plants	Herb
69	Turuta	*Hemerocalilis fulva*	Liliacea	Wild Plants	Herb
70	Tapak dara	*Catharanthus roseus*	Apocynaceae	Wild Plants	Bush

Previous studies on village customs in Foramadiahi identified approximately 20 types of medicinal plants used by the local community and residents in the surrounding area. These medicinal plants are used in traditional medicine, either individually or in combination (Hidayat et al., 2023). Meanwhile, the study of Pitra et al. (2017) documented 27 species of medicinal plants distributed across 19 families, which are utilized by the community of Moya Village Ternate District, as traditional medicine.

A total of 73 medicinal plant species were recorded as being used by the communities in Foramadiahi, Tubo and Salahuddin villages. Of these, 70 species were successfully identified, belonging to 40 families. The families Euphorbiaceae, Lamiaceae, Zingiberaceace, and Piperaceae were the most represented, each comprising four species each. Additionally, several families, such as Cucurbitaceae, Poaceae, Acantaceae, Moraceae, and Anacardiacea, were relatively common, with three species each. Based on interviews conducted with informants during the study, 70 species of medicinal plants were identified at the research site. These plants include cultivated, semi-cultivated, and wild species of the family Fabaceae.The interviews also provided information regarding the types of medicinal plants, their therapeutic uses, methods of preparation, and traditional practices for administration, which have been passed down through generations. The Philips and Gentry formula was applied in this descriptive, qualitative study. Data were categorized according to the type of medicinal plant, method of preparation, mode of use, therapeutic properties, and disease treated. The estimated use value for each species was calculated using the formula proposed by Philips and Gentry (1993), which was also used by Hoffman and Gallaher (2007).

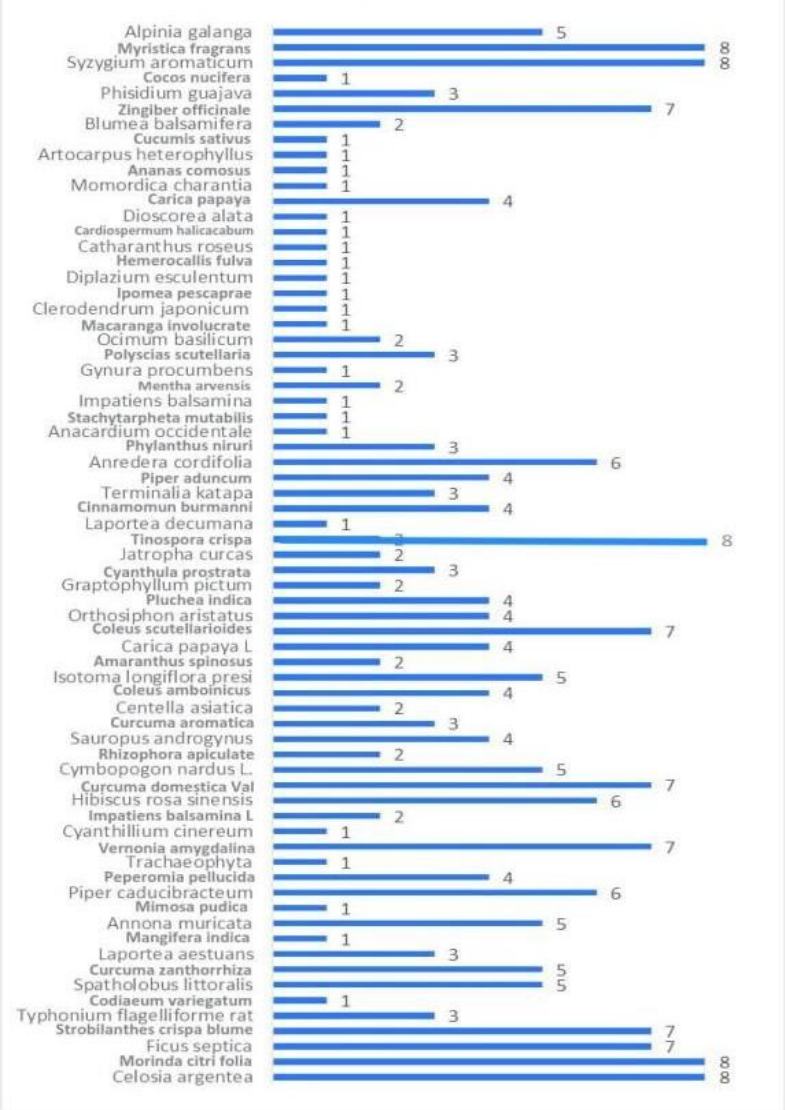

Figure 3. Use Value and frequently utilized species

The calculation of Use Value (UVs) revealed ten medicinal plant species with the highest scores: *Strobilantes crispus* (Pecah beling), *Curcuma domestica* Val (turmeric), *Syzygium aromatica* (clove), *Myristica fragrans* (nutmeg), *Coleus scutellaroides* (miana), *Tinospora crispa* (brotowali), *Zingiber officinale* (ginger), *Vernonia amygdalina* Del (African leaf), *Morinda citrifolia* (noni), and *Ficus septica* (tagalolo leaf). Detailed information is presented in Figure 3. Among these, *Syzygium aromaticum* and *Myristica fragrans* exhibit the highest UVs score (8), placing them in the category of "highly useful plants" (6<UVs≤9). In contras, Mangifera indica recorded a UVs score of 1, which falls under the "slightly useful" category (0<UVs<3). A high UVs score indicates that the species is widely recognized for its medicinal benefits and that knowledge of its uses is well established within the community (Albuquerque et al., 2013).

In Foramadiahi village, local communities traditionally utilize a combination of clove (*Syzygium aromaticum*) and nutmeg (*Myristica fragrans*) to relieve abdominal bloating. Dried clove buds are mixed with crushed nutmeg seeds and applied topically to the abdomen. Nutmeg is known to contain bioactive compounds such as saponin, flavonoids, polyphenols, and essential oils, which are associated with carmninative, digestive, and stimulant effects, supporting its traditional use for gastrointestinal discomfort. Similarly, clove essential oil hs been reported to exhibit antispasmodic and anti-inflammatory activities that may contribute to its effectiveness in relieving bloating.

Another commonly used medicinal plant is brotowali (*Tinospora crispa*), which is traditionally prepared as a decoction to treat malaria and febrile illnesses. Pharmacological studies have demonstrated that *T. crispa* possesses antimalarial, antioxidant, and immunomodulatory activities, attributable to its alkaloids, glycosides, and terpenoid constituents (ahmad et al., 2016). In addition, mango (*Mangifera indica*) and mayana (*Coleus scutellarioides*) are employed as complementary remedies for malaria and wound healing, particularly during postpartum recovery. The continued use of these plants reflects the community's empirical knowledge and aligns with scientific evidence supporting their therapeutic potential.

3.4 Plant parts utilized as medicine

Different plant part were utilized for the preparation of herbal medicines, however, leaves were the most frequently used pplant part, constituting 64%, followed by flower (9%), stems (6 %), rhizomes (5%), bark (4%), roots (3%), seeds (2%) and whole plant (5 %) (Figure 4).

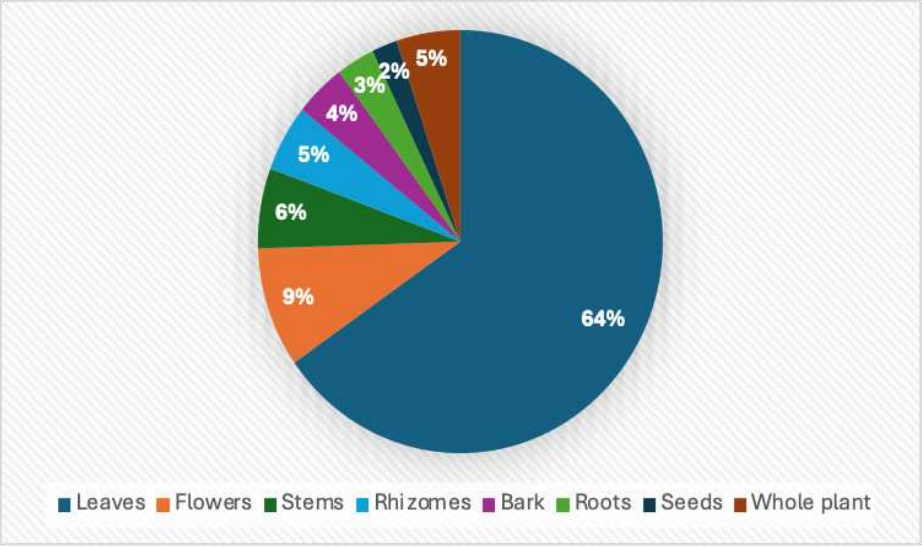

Figure 4. Graph of medicinal plants by part used

The high usage of leaves in making herbal medicines as compared to other plant parts is due to the reason that it is easier to collect and it possess threat to the local flora (Nuneza et al., 2021). Leaves are the primary storage site for chemical compounds produced through photosynthesis, making them a major source of active constituens in herbal preparation (Guevara & Garcia, 2018). Hamel et al. (2018) noted that leaves synthesize secondary metabolites, and their frequent use is justified by the abundance of chemical groups they contain. Furthermore, Khan et al. (2014) reported that harvesting leaves is less harmful to the plant's life cycle compared to other parts such as root or flowers, and their high utilization is largely due to easy accessibility.

3.5 Methods of preparation and mode of application

The preparation and administration of the medicinal plants vary based on the type of disease treated. In this study, there were nine common methods of preparation recorded. The most common methods include boiling, drying, infusion, roasting, consumed raw, grinding, chewing, chopping and slicing. Among these, boiling was the predominant method, accounting for appromimately 50% of all processing techniques. Boiling is preferred because it is the easiest way to prepare and believed to eliminate harmful microorganism, making the preparation safer for internal use. Additionally, boiling facilitates the extraction of water-soluble compounds, such as flavonoids, which are easily absorbed by the body. In contras, roasting and chewing were the least popular, each representing only about 2% (Figure 5).

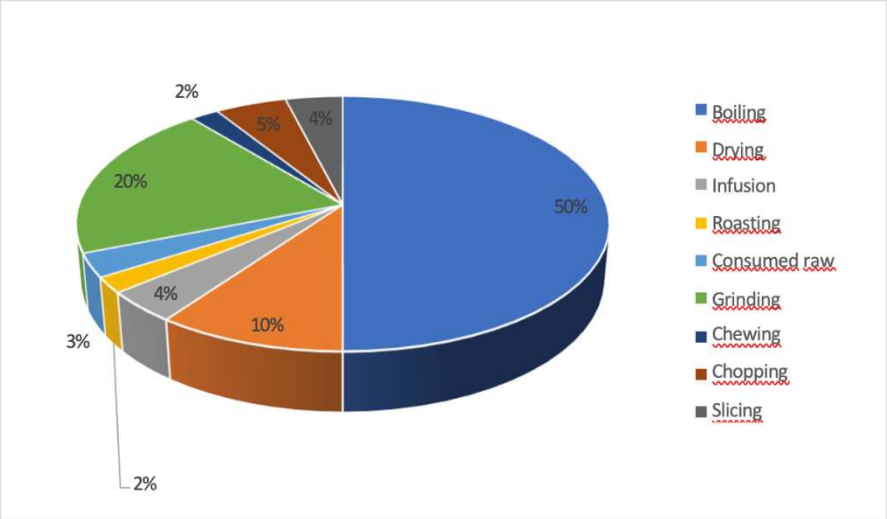

Figure 5. Method of preparation of medicinal plants

Leaves are the most commonly used plant part, and boiling is the predominant method for preparing decoctions to treat internal ailments such as fever. For instance, Hibiscus rosa sinensis leaves are boiled to relieve internal heat and aid childbirth, while Orthosiphon aristatus leaves are used to reduce fever. Topical applications often involve crushed leaves applied to wounds or affected areas. For example Anredera cordifolia leaves are ground and mixed with water to treat abrasions. Different processing methods can produce varying therapeutic effects. Plants containing toxins require prolonged boiling over low heat (3-5 hours) to reduce toxicity (Adyana, 2012).

In several villages, such as Foramadiahi, Kastela, Dorpedu, Gambesi, Fitu, Ngade, Moya, Tubo and Tarau, communities often combine two medicinal plants to treat a single condition, a practice known as "rorano". For example, nutmeg and clove are combined to relieve bloating by crushing nutmeg seeds and mixing them with whole cloves before applying the mixture to the abdomen. This practice reflect the community's rich traditional knowledge in utilizing natural resouces for health. Importantly, this traditional practice is supported by pharmacological evidence. Nutmeg has been reported to possess carminative, antispasmodic, and anti-inflammatory properties, largely attributed to its bioactive compound such as myristin, elemicin, and safrole, which contribute to gastrointestinal smooth muscle

relaxation and digestive regulation (Luo et al., 2025). Meanwhile, clove is rich in eugenol, a phenolic compound widely recognized for its analgesic, anti-inflammatory, and antimicrobial activities, as well as its ability to alleviate gastrointestinal discomfort. Experimental and clinical studies have demonstrated that eugenol exhibits antispasmodic effects and modulates intestinal motility, supporting its traditional use in treating bloating and abdominal pain. The synergistic combination of nutmeg and clove in rorano may therefore enhance therapeutic efficacy through complementary pharmacological mechanisms, including anti-inflammatory activity, smooth muscle relaxation, and modulation of gut motility. This aligment between traditional knowledge and modern pharmacological findings highlights the scientific relevance of traditional pharmacy heritage in Ternate and underscores its potential as a foundation for further phytopharmacological and drug development studies.

4. CONCLUSION

Traditional medicinal plants play a vital role in the healtcare practices of Ternate communities, offering practical, accessible, and culturally accepted remedies for a wide range of ailments. The diversity of species and preparation methods underscores the depth of ethnobotanical knowledge and its potential contribution to pharmacological research. Preserving and documenting this knowledge is essential for sustainable biodiversity management and for developing evidence-based herbal medicines.

5. ACKNOWLEDGMENT

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