

Quantitative ethnobotanical assessment of Zingiberaceae used as food and traditional medicine in Sabang Island, Aceh, Indonesia

DETA PRISTIHAYATI¹, SAUDAH^{2,*}, DIAN ASWITA³

¹Graduate Program of Biology Education, Universitas Serambi Mekkah, Jl. Unmuha Batoh, Banda Aceh 23245, Aceh, Indonesia

²Department of Biology Education, Postgraduate Program, Universitas Serambi Mekkah, Jl. Unmuha Batoh, Banda Aceh 23245, Aceh, Indonesia.

Tel.: +62-651-26160, *email: saudah@serambimekkah.ac.id

³Department of Biology Education, Postgraduate Program, Universitas Negeri Makassar, Jl. Bonto Langkasa, Banta-Bantaeng, Rappocini, Makassar 90222, South Sulawesi, Indonesia

Manuscript received: 25 September 2025. Revision accepted: 2 March 2026.

Abstract. *Pristihayati D, Saudah, Aswita D. 2026. Quantitative ethnobotanical assessment of Zingiberaceae used as food and traditional medicine in Sabang Island, Aceh, Indonesia. Asian J Ethnobiol 9 (1): y090113. <https://doi.org/10.13057/asianjethnobiol/y090113>.* The Zingiberaceae family is widely recognized for its ethnomedicinal and culinary importance in Indonesia; however, scientific documentation of its traditional use in Sabang, Aceh, remains limited. This study aimed to document the diversity, utilization patterns, and cultural significance of Zingiberaceae species use by the Sabang community. A total of 16 species across 9 genera were recorded and classified into 4 main categories: vegetables, beverages, traditional medicine, and spices. Quantitative ethnobotanical indices, Use Value (UV) and Informant Consensus Factor (ICF), were applied to evaluate species importance and community agreement. Rhizomes were the most frequently utilized plant part (12 species), followed by leaves (5 species), flowers (4 species), fruits (4 species), and pseudostems (1 species), with rhizomes predominating in medicinal preparations. Zingiberaceae species were used to treat five disease categories, namely reproductive health, digestive disorders, metabolic degenerative diseases, body and skin care, and general ailments. *Curcuma longa* (UV=0.95) and *Zingiber officinale* (UV=0.93) emerged as the most culturally significant species, reflecting their multifunctional roles in food and traditional medicine. High ICF values in spice (0.934) and vegetable (0.909) categories indicate strong consensus among informants, suggesting a well-preserved and homogenous body of ethnobotanical knowledge. These findings highlight the dual role of Zingiberaceae as both functional foods and phytotherapeutic resources, and underscore the importance of documenting and conserving traditional knowledge to support biodiversity conservation and ethnobotanical education.

Keywords: Ethnobotany, cultural knowledge, functional food, traditional medicine, Zingiberaceae

INTRODUCTION

Medicinal plants remain an essential component of traditional healthcare systems, particularly in biodiversity-rich countries such as Indonesia (World Health Organization (WHO) 2013). Knowledge of plant-based medicine in Indonesia has developed through long-term interactions between local communities and their surrounding environments, forming an integral part of the nation's biocultural diversity (Silalahi et al. 2021). This knowledge is traditionally transmitted through daily practice and oral communication; however, it is increasingly threatened by socio economic change, environmental degradation, and shifts toward modern healthcare systems (Vandebroek and Balick 2012). As a result, ethnobotanical documentation plays a crucial role in preserving traditional knowledge and providing scientific insights into culturally important plant resources.

Among plant families widely used in traditional medicine and food systems, Zingiberaceae holds a particularly prominent position in Southeast Asia. Species belonging to this family, such as *Zingiber*, *Curcuma*, *Etilingera*, *Kaempferia*, and *Alpinia*, are commonly utilized as spices, vegetables, herbal beverages, and remedies for

various ailments (Zahara et al. 2018; Jitpromma et al. 2025). Different plant parts including rhizomes, leaves, flowers, and fruits are valued for their rich content of essential oils, phenolic compounds, flavonoids, and other bioactive constituents that support their ethnopharmacological relevance (Mao et al. 2019). Numerous studies have demonstrated the anti-inflammatory, antimicrobial, antioxidant, and digestive properties of Zingiberaceae species, providing scientific validation for their widespread traditional use.

Despite their importance, traditional knowledge related to Zingiberaceae is not uniformly documented across Indonesia. In many regions, especially small islands and peripheral communities, plant-use knowledge remains poorly recorded (Reyes-García et al. 2013). Sabang, located on Weh Island at the northernmost tip of Sumatra, represents one such understudied area (Nelly et al. 2020). The island's geographical isolation, coupled with its strong cultural traditions, has contributed to the continued reliance on plant-based resources for food and healthcare. Zingiberaceae species are widely incorporated into daily life in Sabang, including culinary practices, herbal beverages, postpartum care, and general health treatments. However, scientific documentation focusing specifically on

the diversity, utilization patterns, and cultural significance of Zingiberaceae in Sabang is still limited.

The erosion of traditional plant knowledge poses a particular risk in island communities, where intergenerational transmission may be disrupted by changing livelihoods and reduced dependence on natural resources. Without systematic documentation, valuable ethnobotanical information may be lost, along with potential insights for pharmacological research and sustainable resource management. Quantitative ethnobotanical approaches, such as Use Value (UV), Informant Consensus Factor (ICF), and Fidelity Level (FL), offer robust tools for assessing the cultural importance of plant species and the degree of agreement among community members regarding their use. These indices help distinguish culturally significant species from those used more sporadically and provide a clearer understanding of how traditional knowledge is structured within a community.

Although ethnobotanical studies of Zingiberaceae have been conducted in several regions of Indonesia, quantitative ethnobotanical assessment focusing specifically on coastal island communities such as Sabang remains limited. Island ecosystems often exhibit unique cultural ecological interactions, which may influence plant use patterns and knowledge distribution. Therefore, documenting and quantitatively analyzing Zingiberaceae utilization in Sabang is essential to fill this knowledge gap.

Given these considerations, a focused ethnobotanical study of Zingiberaceae in Sabang is both timely and necessary. Such research contributes to filling regional knowledge gaps, supports comparative ethnobotanical studies across Indonesia, and strengthens the scientific basis for conserving culturally important plant species. Therefore, this study aims to document the diversity of Zingiberaceae species used by the Sabang community, identify the plant parts most frequently utilized, and analyze their applications in food and traditional medicine using quantitative ethnobotanical indices (UV, ICF, and FL). By addressing these objectives, the study provides a comprehensive account of Zingiberaceae ethnobotany in Sabang and contributes to broader discussions on the conservation of biocultural diversity in Indonesia.

MATERIALS AND METHODS

Study area

The study was conducted in Beurawang Village, Sabang City, Aceh Province, Indonesia, located on Weh Island at approximately 5°46'40" N and 95°20'20.17" E. Beurawang Village is a rural coastal community where traditional knowledge of medicinal plants, particularly Zingiberaceae, remains actively practiced. The local environment consists of coastal and lowland ecosystems that support the growth of diverse plant species. The primary livelihoods of the community include fishing, small-scale agriculture, and traditional food processing, all of which contribute to the continued use and transmission of plant-based knowledge.

Procedures

Ethnobotanical data collection

Ethnobotanical data were collected through direct field observation, documentation, and semi-structured and structured interviews with informants knowledgeable about the use medicinal plants (Pieroni et al. 2007). Interviews were conducted with traditional healers, village leaders, and community members recognized for their experience in preparing or using plant-based remedies. Informants were selected using a snowball sampling technique (Nahdi et al. 2016), in which initial participants recommended additional informants. This approach is particularly suitable for the ethnobotanical research because knowledge of medicinal plants is often concentrated among specific members of the community.

A total of 20 respondents, age 26 to 65 years, were interviewed. This age range represents individuals with established experience and long term involvement in local medicinal practices, ensuring the reliability of the information obtained. Interview questions focused on plant species used, local name, plant parts utilized, preparation methods, categories of ailments treated.

Plant specimens were documented during guided field walks with informants and photographed to capture diagnostic morphological characteristics and habitat conditions. Taxonomic identification was conducted using regional floristic references, and all scientific names were verified for accepted nomenclature through the Global Biodiversity Information Facility and Plants of the World Online databases (GBIF 2025; POWO 2025). As the study relied on non-destructive sampling and community based field observations, formal herbarium vouchers were not prepared. Instead, high resolution photo vouchers were archived as supporting documentation to ensure traceability and verification of the recorded species.

Fieldwork was carried from March to June 2025. All respondents participated voluntarily after receiving information about the study objectives of the study, data usage, and confidentiality measures. Verbal or written informed consent was obtained prior to each interview, and participants were informed of their right to withdraw from the study at any time without consequence.

Data analysis

The data were analyzed using descriptive statistical methods to summarize socio-demographic characteristics of respondents and the frequency of plant use. In addition, two quantitative ethnobotanical indices, Use Value (UV), and Informant Consensus Factor (ICF) were applied to assess species importance and the degree of agreement among informants.

Use Value (UV)

Use Value (UV) was calculated to assess the relative cultural importance of each plant species based on the frequency of use reports, following Etongo et al. (2017). The index was calculated using the following formula:

$$UV = \frac{\sum U}{N}$$

Where, $\sum U$ is the total number of use reports cited for a given species, and N is the total number of informants interviewed. Higher UV values indicate greater versatility and cultural significance of a species within the community.

Informant Consensus Factor (ICF)

Informant Consensus Factor (ICF) was used to measure the degree of agreement among informants regarding plant use within specific ailment categories, following Abe and Ohtani (2013) and Trotter and Logan (2019). The index was calculated as:

$$ICF = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Where, N_{ur} is the number of use reports for a particular ailment category, and N_t is the number of species used for that category. ICF values range from 0 to 1, with higher values indicating stronger consensus and greater homogeneity in species selection among informants.

Ethical considerations

This study involved non-invasive ethnobotanical research based on interviews and field observations and did not include clinical interventions or experimental procedures involving human subjects. Therefore, formal institutional ethics approval was not required. All informants participated voluntarily after receiving a clear explanation of the study objectives, data usage, and confidentiality measures. Verbal or written informed consent was obtained prior to each interview, and participants were informed of their right to withdraw from the study at any time without consequence.

RESULTS AND DISCUSSION

Socio-demographic characteristics

A total of 20 respondents were interviewed in this study, consisting of 13 female (65%) and 7 male (35%) participants (Table 1). Female respondents represented the majority of participants, indicating that women may play a more prominent role in the knowledge and use of medicinal plants within the community. In terms of age distribution, most respondents were between 56-65 years (45%), followed by those aged 36-55 years (35%) and 26-35 years (20%). This pattern indicates that ethnomedicinal knowledge is concentrated among older community members. Regarding educational background, respondents with no formal education accounted for 20%, primary school graduates 30%, junior high school graduates 15%, senior high school graduates 25%, and university graduates 10%. These results suggest that traditional knowledge is primarily preserved among individuals with lower to middle levels of formal education. In terms of occupation, the

respondents consisted of housewives (55%) and fishermen (45%). This finding suggests that both household practices and close interaction with natural resources contribute to the knowledge and utilization of medicinal plants in the community.

Species diversity of Zingiberaceae

A total of 16 Zingiberaceae species belonging to nine genera were documented in this study, namely *Etilingera*, *Zingiber*, *Curcuma*, *Kaempferia*, *Alpinia*, *Amomum*, *Boesenbergia*, *Wurfbainia*, and *Elettaria*. These species represent the core Zingiberaceae flora utilized by the local community in Beurawang Village. Their diversity reflects the broad functional use of this family in daily life, ranging from culinary ingredients to traditional medicinal preparations. The full list of species, including their local names and utilization categories, is presented in Table 2.

Utilization categories

Zingiberaceae species recorded in this study were grouped into four main utilization categories: vegetables, beverages, traditional medicine, and spices (Table 2). Although many species were used across multiple categories, traditional medicine represented the most dominant use.

Vegetables

Two species, *Etilingera elatior* (*kecombrang*) and *Etilingera hemisphaerica*, were consumed as vegetables, particularly their flowers and young leaves, which are commonly incorporated into local dishes.

Beverages

Four species *Zingiber officinale* (ginger), *Kaempferia galanga* (*kencur*), *Curcuma longa* (turmeric), and *Elettaria cardamomum* (Indian cardamom) were used as ingredients in traditional herbal drinks, such as *jamu* and local tonics, believed to promote stamina and general well-being.

Table 1. Socio-demographic characteristics of respondents in Beurawang Village, Sabang, Aceh, Indonesia

Variable	Category	Total	Percentage (%)
Gender	Female	13	65
	Male	7	35
Age	26-35	4	20
	36-55	7	35
	56-65	9	45
Education	No Formal education	4	20
	Primary School	6	30
	Junior High School	3	15
	Senior High School	5	25
	University	2	10
Occupation	Fisherman	9	45
	Housewife	11	55

Table 2. Zingiberaceae species utilized by local communities in Beurawang Village, Sabang Island, Aceh, Indonesia

Scientific name	Local name	Plant parts used	Main uses (categories)	Vegetable	Beverage	Traditional medicine	Spice
<i>Alpinia galanga</i> (L.) Willd.	<i>Lengkuas</i>	Rhizome, flower	Spice, digestive problems, body care			✓	✓
<i>Wurfbainia compacta</i> (Sol. ex Maton) Škorničk. & A.D.Poulsen	<i>Kapulaga</i>	Fruit	Spice, digestive disorders, breath freshener			✓	✓
<i>Boesenbergia rotunda</i> (L.) Mansf.	<i>Temu kunci</i>	Rhizome, fruit	Women's health, reproductive medicine			✓	
<i>Curcuma longa</i> L.	<i>Kunyit</i>	Rhizome, leaf	Spice, digestive disorders, reproductive health, Natural food colorant		✓	✓	✓
<i>Curcuma xanthorrhiza</i> Roxb.	<i>Temulawak</i>	Rhizome	Tonic, hepatoprotective, traditional medicine			✓	✓
<i>Curcuma aeruginosa</i> Roxb.	<i>Temu ireng</i>	Rhizome	Women's health, postpartum care			✓	
<i>Curcuma zedoaria</i> (Christm.) Roscoe	<i>Temu putih</i>	Rhizome	Menstrual disorders, stomach ailments			✓	
<i>Alpinia malaccensis</i> (Burm.f.) Roscoe	<i>Lengkueh uteun</i>	Rhizome, leaf, flower	General medicine, body tonic			✓	
<i>Etilingera elatior</i> (Jack) R.M.Sm.	<i>Kecombrang</i>	Flower, Pseudostems, Fruit, Leaf	Vegetable, spice, postpartum care	✓		✓	✓
<i>Elettaria cardamomum</i> (L.) Maton	<i>Kapulaga India</i>	Fruit	Spice, beverage, digestive disorders			✓	
<i>Etilingera hemisphaerica</i> (Blume) R.M.Sm.	<i>Kinchung</i>	Leaf, flower	Vegetable, postpartum medicine	✓		✓	✓
<i>Kaempferia galanga</i> L.	<i>Kencur</i>	Rhizome, leaf	Spice, respiratory ailments, jamu		✓	✓	✓
<i>Zingiber officinale</i> Roscoe	<i>Jahe</i>	Rhizome	Beverage, stimulant, digestive disorders		✓	✓	✓
<i>Zingiber officinale</i> var. <i>rubrum</i>	<i>Jahe merah</i>	Rhizome	Energy tonic, cough, stamina			✓	
<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	<i>Lempuyang</i>	Rhizome	Skin care, fever, traditional medicine			✓	
<i>Zingiber cassumunar</i> Roxb.	<i>Kunyit molay</i>	Rhizome	Traditional remedies			✓	

Traditional medicine

Traditional medicine represented the dominant category, with 15 of the 16 species used for treating various ailments. Examples, include *C. longa* for inflammation and postpartum care, *Zingiber cassumunar* for colds and musculoskeletal pain, and *Boesenbergia rotunda* for women's health.

Spices

Seven species were used as spices, notably *E. elatior* (flowers as flavoring), *Z. officinale* (ginger as a staple spice), *Alpinia galanga* (galangal for cooking), and

Wurfbainia compacta (local cardamom). These species contributed distinctive flavors to local dishes, emphasizing their dual role in culinary and medicinal traditions.

Plant parts utilized

The inventory of Zingiberaceae species used by the community in Sabang showed clear variation in the plant organs employed (Figure 1). Rhizomes were the most widely utilized plant part (12 species), reflecting their central role in traditional remedies due to their high content of essential oils, phenolics, and other bioactive compounds that are readily extracted through boiling, pounding, or

maceration. Leaves were used in 5 species, commonly for topical applications and simple decoctions, while flowers and fruits were each reported in 4 species, mainly associated with culinary uses, beverages, and selected medicinal applications. Pseudostems were the least utilized organ, recorded in only one species, indicating their limited accessibility and lower perceived medicinal value. These patterns highlight how the Sabang community prioritizes plant parts based on both phytochemical potency and cultural practicality. Rhizomes dominate ethnomedicinal practices because of their pharmacological richness and versatility across preparation methods, whereas leaves, flowers, and fruits serve more specialized and complementary functions. Pseudostems play only a minor role in local ethnobotanical practices.

Disease categories treated

Zingiberaceae species documented in Sabang were used to treat five major ailment categories, namely reproductive health, digestive disorders, metabolic and degenerative diseases, body and skin care, and general ailments (Table 3). For reproductive health, *E. elatior* and *C. longa* were commonly used in postpartum care, while *Curcuma zedoaria* was applied to relieve menstrual discomfort. Digestive disorders, including colds, gastric irritation, and stomach ulcers, were primarily managed using *Z. officinale* and *K. galanga*.

Metabolic and degenerative conditions such as hypertension and high cholesterol were treated mainly with *C. longa*, *B. rotunda*, and *Curcuma aeruginosa*. In body and skin care, *Zingiber zerumbet* and *B. rotunda* were frequently applied to address eczema, skin infections, and hair-related problems. General ailments, including gout, fatigue, sprains, and certain chronic conditions, were treated using several multipurpose species. Overall, these results demonstrate the broad therapeutic versatility of Zingiberaceae species, with multiple taxa contributing to diverse aspects of traditional healthcare in the Sabang community.

Plant parts used as medicine

The Sankey diagram (Figure 2) shows clear variation in the plant organs utilized from the Zingiberaceae species recorded in Sabang. Rhizomes were the most frequently used plant part, represented by nine species, highlighting their central importance in traditional medicine. Rhizome-based taxa such as *Z. officinale*, *C. longa*, *Curcuma xanthorrhiza*, *C. aeruginosa*, and *K. galanga* dominate medicinal applications due to their high concentrations of essential oils, curcuminoids, and other bioactive compounds commonly extracted through boiling, pounding, or maceration.

Leaves were the second most commonly used organ (four species), particularly from *E. elatior*, *E. hemisphaerica*, and *K. galanga*. Their use reflects practical advantages, including ease of harvesting and suitability for topical preparations, decoctions, and fresh mixtures.

Fruits, represented by three species (*W. compacta*, *E. cardamomum*, *B. rotunda*), were mainly incorporated into treatments related to digestive disorders and general ailments, consistent with their aromatic and carminative properties. Flowers were used far less frequently reported for only a single species (*E. elatior*), primarily in postpartum care and specific traditional remedies. Stems, likewise represented by only one species (*Alpinia malaccensis*), were used in limited applications related to general tonics. Overall, the distribution of plant part utilization indicates that rhizomes and leaves constitute the core of Zingiberaceae-based medicinal practices in Sabang, while flowers, fruits, and stems serve more specialized and culturally specific therapeutic functions.

Table 3. Summary of ailment categories, primary Zingiberaceae species, and typical preparation methods

Disease category	Main species used	Preparation methods
Reproductive health	<i>Etingera elatior</i> , <i>Curcuma longa</i> , <i>Curcuma zedoaria</i> ,	Decoction, postpartum tonic, compress
Digestive disorders	<i>Zingiber officinale</i> , <i>Kaempferia galanga</i> , <i>Boesenbergia rotunda</i>	Herbal drink, infusion, crushed paste
Metabolic degenerative diseases	<i>Curcuma longa</i> , <i>Boesenbergia rotunda</i> , <i>Curcuma aeruginosa</i>	Boiled extract, powdered formulation
Body and skin care	<i>Zingiber zerumbet</i> , <i>Boesenbergia rotunda</i> , <i>Alpinia galanga</i>	Topical paste, medicinal wash, infused oil
General ailments	<i>Curcuma longa</i> , <i>Zingiber officinale</i> , <i>Curcuma zedoaria</i>	Decoction, massage oil, oral tonic

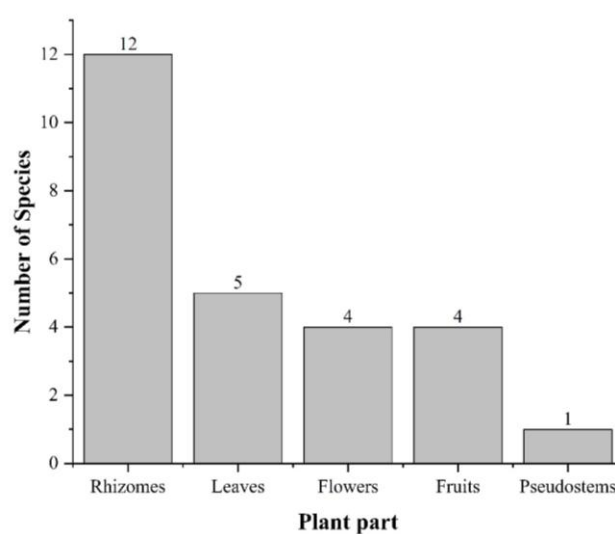


Figure 1. Plant parts of Zingiberaceae species utilized by local communities in Sabang, Aceh, Indonesia

Quantitative ethnobotanical indices

Use Value (UV)

Quantitative ethnobotanical indices revealed clear patterns in the cultural importance of Zingiberaceae species and the level of agreement among informants. Use Value (UV) analysis showed that *C. longa* and *Z. officinale* had the highest cultural importance, reflecting their frequent citation and broad applicability across multiple use categories (Figure 3). Other species displayed moderate to low UV values, indicating more specialized or context-specific uses within the community.

Informant Consensus Factor (ICF)

Informant Consensus Factor (ICF) analysis revealed a generally high level of agreement among informants across all utilization categories (Table 4). The highest consensus was observed in the spice category, followed by vegetables, medicinal uses, and beverages. High ICF values in categories with both high and low numbers of species indicate that knowledge related to Zingiberaceae utilization is widely shared and consistently applied within the community, despite variation in use intensity among categories.

Discussion

The distribution of ethnomedicinal knowledge among respondents reveals clear socio demographic patterns, particularly regarding gender and age. Women demonstrated a more extensive understanding of Zingiberaceae uses, a trend widely reported in ethnobotanical literature. Their central responsibility in family health care and food preparation positions them as primary custodians of household medicinal knowledge (Torri 2010; Razafindraibe et al. 2013; Zumaidar et al. 2024). Similar patterns have been documented globally and within Indonesia, where women consistently act as drivers of knowledge retention and transmission (Suwardi et al. 2021; Chaudhary et al. 2025). Age-related differences were

also pronounced: older community members possessed significantly greater knowledge than younger individuals. This generational decline reflects broader socio-cultural transitions, including reduced engagement with traditional practices, weakening intergenerational learning networks, biodiversity loss, and increasing reliance on formal medical systems (Mathez-Stiefel et al. 2012; Reyes-Garcia et al. 2013). Such dynamics underscore the urgent need to strengthen mechanisms for intergenerational transfer to prevent further erosion of biocultural memory.

The relationship between education level and traditional knowledge also offers insight into local knowledge ecology (Saudah et al. 2025). Respondents with lower levels of formal education retained more extensive ethnomedicinal knowledge, aligning with findings from rural communities elsewhere in Southeast Asia where plant-based knowledge persists most strongly in socio-economically marginalized groups (Ernilasari et al. 2021; Sudirgayasa al. 2025). This pattern reflects both limited access to biomedical facilities and a continued dependence on natural resources. However, as younger and more formally educated individuals become increasingly disconnected from local ecosystems, proactive documentation and curricular integration of ethnobotanical knowledge become essential for its long-term preservation (Santos et al. 2022; Monalisa et al. 2024).

Table 4. Informant Consensus Factor (ICF) values of Zingiberaceae utilization in four food categories (vegetables, beverages, traditional medicine, and spices) in Sabang, Aceh, Indonesia

Category	Nur	Nt	ICF
Spices	122	9	0.934
Vegetables	55	6	0.909
Medicinal Uses	182	28	0.853
Beverages	45	9	0.818

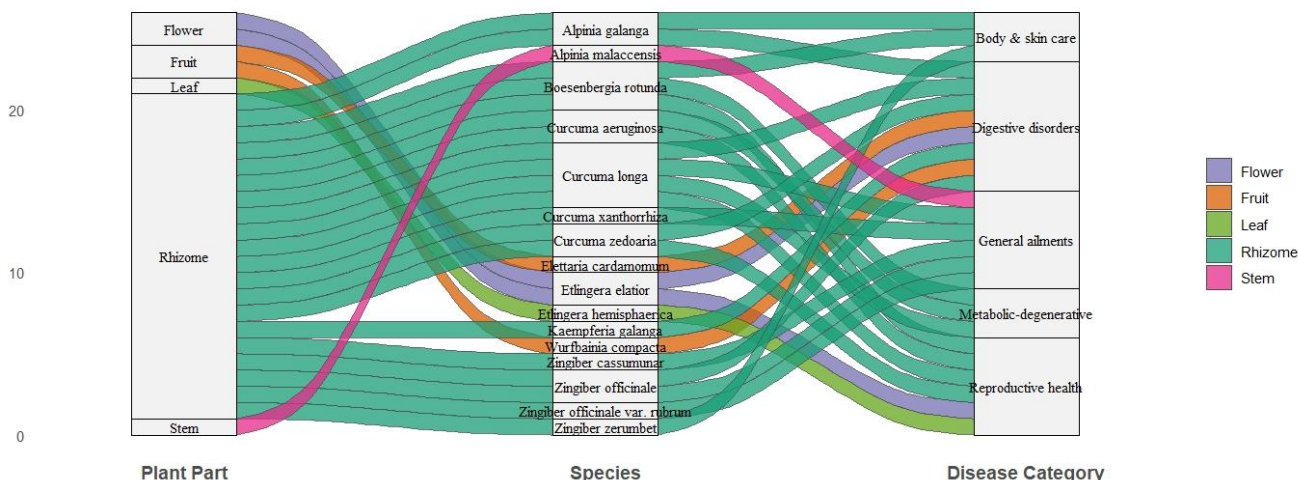


Figure 2. The utilization of Zingiberaceae species by the Acehnese community in Indonesia, was grouped into five major disease categories

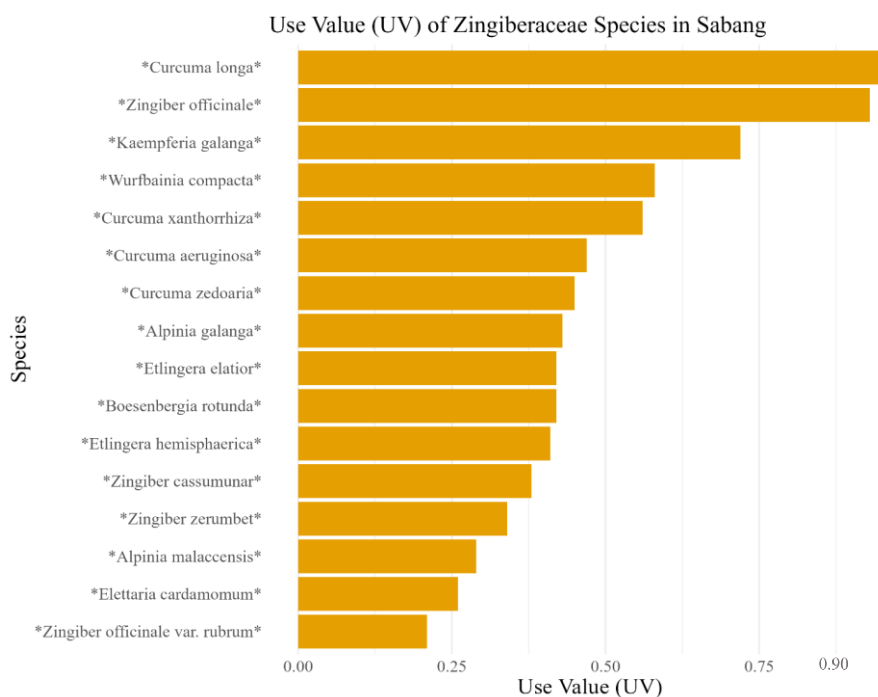


Figure 3. Use Value (UV) of Zingiberaceae utilization in four food categories (vegetables, beverages, traditional medicine, and spices) in Sabang, Aceh, Indonesia

The functional diversity of Zingiberaceae use in Sabang illustrates the fluid continuum between food and medicine, a hallmark of ethnobotanical systems in the Indo-Malayan region. Sixteen species across nine genera were documented, with *Etingera* and *Curcuma* emerging as culturally salient taxa due to their multifunctional roles across culinary, therapeutic, and ceremonial contexts. This multifunctionality is widely recognized in Indonesian ethnobotany, where Zingiberaceae species serve as both everyday food components and key therapeutic agents for reproductive health, digestive ailments, metabolic disorders, and general well-being (Zumaidar et al. 2019; Saudah et al. 2021; Vafaeipour et al. 2022; Hafizah and Fitmawati 2023)

Patterns of plant-part utilization reinforce these functional linkages. Rhizomes, leaves, and fruits were the most frequently used organs, reflecting both their accessibility and their phytochemical richness. Rhizomes particularly those of *Z. officinale* and *C. longa* are known for high concentrations of essential oils, curcuminoids, and phenolic compounds exhibiting strong anti-inflammatory, antioxidant, and antimicrobial activity (Sharifi-Rad et al. 2017; Zumaidar et al. 2024). Leaves and fruits contribute aromatic qualities, culinary versatility, and mild therapeutic properties, making them central to both dietary and medicinal preparations. The relatively infrequent use of flowers, seeds, and pseudostems suggests more specialized or seasonal applications, as observed in other ethnobotanical studies across Southeast Asia (Suwardi et al. 2021; Nelly et al. 2024; Torimbanu et al. 2024).

The classification of ethnomedicinal uses into five disease categories further demonstrates the breadth of

Zingiberaceae's therapeutic relevance. Species associated with reproductive health most notably *E. elatior* and *C. longa* play a particularly important role in postpartum recovery, consistent with traditional practices documented among diverse Indonesian ethnic groups (Silalahi et al. 2021; Hafizah and Fitmawati 2023; Ridhwan et al. 2025). The use of *Z. officinale* and *K. galanga* for digestive disorders aligns with pharmacological evidence supporting their carminative and gastroprotective effects (Alfuraydi et al. 2024). Species such as *C. longa* and *B. rotunda* were also prominent in remedies for metabolic conditions, corroborating their lipid-lowering, hepatoprotective, and anti-inflammatory properties (Ahmad et al. 2024; Tian et al. 2025).

Quantitative ethnobotanical indices strengthen the interpretation of cultural importance. High UV values for *C. longa* (0.95) and *Z. officinale* (0.93) reflect their widespread multifunctional use, while moderate UV values for *K. galanga* and *C. xanthorrhiza* highlight their complementary roles in food medicine systems. The high ICF scores for spice (0.934), vegetable (0.909), and medicinal (0.853) categories indicate strong agreement among informants, suggesting that plant selection in Sabang is guided by deeply embedded cultural norms and long-standing experiential validation.

Overall, the results underscore the significance of Zingiberaceae as both culinary and therapeutic resources, integral to Sabang's biocultural heritage. Preserving this knowledge offers pathways for pharmacological research, value-added product development, and the promotion of sustainable biodiversity use. Integrating local ethnobotanical knowledge into community-based

conservation and formal education particularly through place-based learning approaches could help ensure the continuity of cultural traditions while enhancing ecological stewardship in Aceh.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the financial support from the Directorate General of Higher Education, Research, and Technology of the Republic of Indonesia (*Direktorat Jenderal Pendidikan Tinggi, Riset, dan Teknologi, Kemendikbudristek*), through the *Penelitian Tesis Magister (PTM)* grant scheme, under Contract No. 134/C3/DT.005.00/PL/2025, administered by the Institute for Research and Community Service (LPPM), Universitas Serambi Mekkah, Aceh, Indonesia, through Agreement No. 030/LPPM-USM/VI/2025. The authors also express their sincere appreciation to the community of Beurawang Village, Sabang, Aceh, for their cooperation and for sharing valuable ethnobotanical knowledge during the fieldwork. The authors declare no conflict of interest.

REFERENCES

- Abe R, Ohtani K. 2013. An ethnobotanical study of medicinal plants and traditional therapies on Batan Island, the Philippines. *J Ethnopharmacol* 145 (2): 554-565. <https://doi.org/10.1016/j.jep.2012.11.029>.
- Ahmad B, Tian C, Tang JX, Dumbuya JS, Li W, Lu J. 2024. Anticancer activities of natural abietic acid. *Front Pharmacol* 15: 1392203. <https://doi.org/10.3389/fphar.2024.1392203>.
- Alfuraydi AA, Aziz IM, Almajhdi FN. 2024. Assessment of antioxidant, anticancer, and antibacterial activities of the rhizome of ginger (*Zingiber officinale*). *J King Saud Univ Sci* 36 (3): 103112. <https://doi.org/10.1016/j.jksus.2024.103112>.
- Chaudhary S, Koirala SB, Dhungana L, Khand S, Neupane S, Rai E. 2025. Ethnomedicinal plants used for immediate care in Nepal: A cross-cultural review. *J Ethnobiol Ethnomed* 21 (75): 1-23. <https://doi.org/10.1186/s13002-025-00807-y>.
- Ernilasari, Walil K, Fitmawati, Roslim DI, Zumaidar, Saudah, Rayhannisa. 2021. Antibacterial activity of leaves, flowers, and fruits extract of *Etilingera elatior* from Nagan Raya District, Indonesia against *Escherichia coli* and *Staphylococcus aureus*. *Biodiversitas* 22 (10): 4457-4464. <https://doi.org/10.13057/biodiv/d221039>.
- Etongo D, Djenontin INS, Kanninen M, Glover EK. 2017. Assessing use values and relative importance of forest products in tropical landscapes. *For Policy Econ* 80: 63-72. <https://doi.org/10.1016/j.forpol.2017.03.008>.
- Global Biodiversity Information Facility (GBIF). 2025. Global Biodiversity Information Facility. <https://www.gbif.org>.
- Hafizah L, Fitmawati. 2023. Studi etnobotani pemanfaatan Zingiberaceae oleh masyarakat Melayu di Pulau Rupat, Kabupaten Bengkalis, Riau. *Al-Kaunyah Jurnal Biologi* 17 (1): 32-45. <https://doi.org/10.15408/kaunyah.v16i2.1.24374>. [Indonesian]
- Jitpromma T, Saensouk S, Saensouk P, Boonma T. 2025. Diversity, traditional uses, economic values, and conservation status of Zingiberaceae in Kalasin Province, Northeastern Thailand. *Horticulturae* 11 (3): 247. <https://doi.org/10.3390/horticulturae11030247>.
- Mao QQ, Xu XY, Cao SY, Gan RY, Corke H, Beta T, Li HB. 2019. Bioactive compounds and bioactivities of ginger (*Zingiber officinale* Roscoe). *Foods* 8 (6): 185. <https://doi.org/10.3390/foods8060185>.
- Mathez-Stiefel SL, Vandebroek I, Rist S. 2012. Can Andean medicine coexist with biomedical healthcare? A comparison of two rural communities in Peru and Bolivia. *J Ethnobiol Ethnomed* 8: 26. <https://doi.org/10.1186/1746-4269-8-26>.
- Monalisa M, Mukramah M, Fathiya N, Saudah, Rayhannisa R. 2024. The role of indigenous plants in sustaining food sources in Lesten Village, Gayo Lues Regency, Indonesia. *Grimsa J Sci Eng Technol* 2 (2): 87-98. <https://doi.org/10.61975/gjset.v2i2.54>.
- Nahdi MS, Martiwi INA, Arsyah DC. 2016. The Ethnobotany of medicinal plants in traditional communities of West Java, Indonesia. *Biodiversitas* 17 (1): 1-7. <https://doi.org/10.13057/biodiv/d170101>.
- Nelly C, Fitriyana L, Santi T, Saudah S. 2024. Diversity of traditional vegetables and spices as local food security for the Gayo Tribe, Aceh, Indonesia. *Biodiversitas* 25 (12): 6178-6187. <https://doi.org/10.13057/biodiv/d251206>.
- Nelly C, Rasnovi S, Zumaidar Z. 2020. Mangrove Ecosystem Suitability for Ecotourism Management Recommendation in Iboih Village, Sabang. *E3S Web Conf* 151: 01060. <https://doi.org/10.1051/e3sconf/202015101060>.
- Pieroni A, Nebel S, Santoro RF, Heinrich M. 2007. Food for two seasons: Culinary uses of non-cultivated local vegetables and mushrooms in a South Italian Village. *Intl J Food Sci Nutr* 58 (2): 1-12. <https://doi.org/10.1080/09637480601145964>.
- Plants of the World Online (POWO). 2025. Plants of the World Online. Royal Botanic Gardens, Kew. <https://powo.science.kew.org>.
- Razafindraibe M, Kuhlman AR, Rabarison H, Rakotoarivelo NH, Randrianarivony T, Ludovic R, Randrianasolo A, Bussmann RW. 2013. Medicinal plants used by women from *Agnalazaha littoral* forest (Southeastern Madagascar). *J Ethnobiol Ethnomed* 9: 73. <https://doi.org/10.1186/1746-4269-9-73>.
- Reyes-García V, Gueze M, Luz AC, Paneque-Gálvez J, Macía MJ, Orta-Martínez M, Rubio-Campillo X. 2013. Evidence of traditional knowledge loss among a contemporary indigenous society. *Evol Hum Behav* 34 (4): 249-257. <https://doi.org/10.1016/j.evolhumbehav.2013.03.002>.
- Ridhwan M, Saudah, Nurman S, Masyudi M, Fitriyana L, Yusnaini R. 2025. Phytochemical composition, antioxidant, and anticancer potential of *Etilingera hemisphaerica* (Zingiberaceae) from the Gayo Highlands, Indonesia. *Asian J Nat Prod Biochem* 23 (2): 101-109. <https://doi.org/10.13057/biofar/f230202>.
- Santos M, Moreira H, Cabral JA, Gabriel R, Teixeira A, Bastos R, Aires A. 2022. Contribution of home gardens to sustainable development: Perspectives from a supported opinion essay. *Intl J Environ Res Public Health* 19 (20): 13715. <https://doi.org/10.3390/ijerph192013715>.
- Saudah S, Rubiah R, Zumaidar Z, Fitriyana L. 2025. Ritual plant diversity and traditional knowledge in the Aneuk Jamee Tribe, Aceh, Indonesia. *Asian J Ethnobiol* 8 (2): 347-366. <https://doi.org/10.13057/asianjethnobiol/y080218>.
- Saudah, Fitmawati, Roslim DI, Zumaidar, Darusman, Ernilasari. 2021. Ethnobotany of *Etilingera elatior* (Jack) R.M. Sm. (Cikala) in the Gayo Ethnic Group. *Proc 3rd KOBi Congress (KOBICIN 2020)*: 14. <https://doi.org/10.2991/absr.k.210621.034>.
- Sharifi-Rad M, Maria E, Salehi B, Sharifi-Rad J. 2017. Plants of the genus *Zingiber* as a source of bioactive phytochemicals: From tradition to pharmacy. *Molecules* 22: 2145. <https://doi.org/10.3390/molecules22122145>.
- Silalahi M, Nisyawati, Purba E, Abinawanto, Wahyuningtyas R. 2021. Ethnobotanical study of Zingiberaceae rhizomes as traditional medicine. *J Trop Ethnobiol* 4 (2): 78-95. <https://doi.org/10.46359/jte.v4i2.54>.
- Sudirgayasa IG, Mahanal S, Gofur A. 2025. Digitization of rare Balinese Hindu ritual plants for conservation and biology education. *Biodiversitas* 26 (6): 2735-2745. <https://doi.org/10.13057/biodiv/d260618>.
- Suwardi AB, Mardudi, Navia ZI, Baihaqi, Muntaha. 2021. Documentation of medicinal plants used by Aneuk Jamee tribe in Kota Bahagia Subdistrict, South Aceh, Indonesia. *Biodiversitas* 22 (1): 6-15. <https://doi.org/10.13057/biodiv/d220102>.
- Tian WW, Liu L, Chen P, Yu DM, Li QM, Hua H, Zhao JN. 2025. *Curcuma longa* (turmeric): From traditional applications to modern plant medicine research hotspots. *Chin Med* 20 (1): 76. <https://doi.org/10.1186/s13020-025-01115-z>.
- Torimbanu AR, Saputra AF, Aulia AA, Utomo AN, Safira RN, Yasa A, Saensouk S, Setyawan AD. 2024. Ethnobotany of medicinal plants used by the Javanese community of Mount Merapi National Park,

- Central Java, Indonesia. *Asian J Ethnobiol* 7 (2): 130-143. <https://doi.org/10.13057/asianjethnobiol/y070206>.
- Torri MC. 2010. Increasing knowledge and traditional use of medicinal plants by local communities in Tamil Nadu: Promoting self-reliance at the grassroots level through a community-based entrepreneurship initiative. *Complement Health Pract Rev* 15 (1): 40-51. <https://doi.org/10.1177/1533210110379938>.
- Trotter RT, Logan MH. 2019. Informant consensus: A new approach for identifying potentially effective medicinal plants. *J Ethnopharmacol* 12: 5-10. <https://doi.org/10.4324/9781315060385-6>.
- Vafaeipour Z, Razavi BM, Hosseinzadeh H. 2022. Effects of turmeric (*Curcuma longa*) and its constituent (curcumin) on metabolic syndrome: An updated review. *J Integr Med* 20 (3): 193-203. <https://doi.org/10.1016/j.joim.2022.02.008>.
- Vandebroek I, Balick MJ. 2012. Globalization and loss of plant knowledge: Challenging the paradigm. *PLoS One* 7 (5): e37643. <https://doi.org/10.1371/journal.pone.0037643>.
- World Health Organization (WHO). 2013. WHO Traditional Medicine Strategy 2014-2023. World Health Organization, Geneva.
- Zahara M, Hasanah M, Zalianda R. 2018. Identification of Zingiberaceae as medicinal plants in Gunung Cut Village, Aceh Barat Daya, Indonesia. *J Trop Hortic* 1 (1): 1-5. <https://doi.org/10.33089/jthort.v1i1.9>.
- Zumaidar, Husna S, Amalia, Asmilia N, Saudah. 2024. Ethnobotany of Zingiberaceae in the Tamiang Tribe, Aceh Province, Sumatra. *IOP Conf Ser Earth Environ Sci* 1352 (1): 012105. <https://doi.org/10.1088/1755-1315/1352/1/012105>.
- Zumaidar, Saudah, Rasnovi S, Harnelly E. 2019. Indigenous knowledge of postnatal mother care using plants by Acehnese. *IOP Conf Ser Earth Environ Sci* 364 (1): 012025. <https://doi.org/10.1088/1755-1315/364/1/012025>.