

# Coastal medicinal plant diversity and its role in community health resilience in East Aceh, Indonesia

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**Abstract.** Nursamsu, Nurhafidha, Warsodirejo PP, Mardudi. 2025. Coastal medicinal plant diversity and its role in community health resilience in East Aceh, Indonesia. *Biodiversitas* 26: 6335-6351. The coastal medicinal plant diversity represents an important component of community health resilience. This study documented the diversity and use patterns of medicinal plants utilized by coastal communities in East Aceh, Indonesia. Semi-structured interviews and field walks were conducted in five villages Kuala Idi, Gampong Aceh, Blang Geulumpang, Ulee Blang, and Titi Baro covering 100 informants. A total of 125 taxa from 55 families were identified, dominated by the Poaceae family. The highest Use Value (UV) was recorded for *Cocos nucifera* (0.92), while the maximum Relative Frequency of Citation (RFC) reached 0.98 for *Oryza sativa*, *Piper betle*, and *Alpinia galanga*. Sixteen disease categories were classified based on WHO ICD-10, totaling 11,456 use reports, with Informant Consensus Factor (ICF) values between 0.98-1.00, indicating strong community agreement. Leaves were the most frequently used plant part (42.4%), and drinking (60.8%) was the predominant method of administration. Diversity indices were high across all sites (Simpson 1-D = 0.9918-0.9920; Shannon H' = 4.813-4.823), reflecting balanced species distribution and rich ethnobotanical knowledge. These findings highlight the pivotal role of coastal biodiversity in sustaining traditional medicine systems and community health. Strengthening conservation, sustainable utilization, and knowledge transmission is vital to preserving these resources for future generations.

**Keywords:** Diversity, ethnopharmacology, health resilience, medicinal plants, use value

## INTRODUCTION

In various parts of the world, medicinal plants are gaining attention as a natural alternative that plays a role in supporting public health and reducing dependence on synthetic drugs (El-Saadony et al. 2025). In Southeast Asia, traditional plant-based medicine practices have long been an important part of local health systems. A recent study in Sabah, Malaysia, recorded 185 species of medicinal plants used by coastal communities (Mahali et al. 2023), while in Vietnam, documentation shows the use of more than 200 species for daily needs (Nguyen et al. 2019). In the Philippines, there are even 796 species of medicinal plants used by various ethnic groups (Plang et al. 2024; Tanalgo et al. 2025). This confirms that coastal areas are rich centers of traditional knowledge, yet have not been fully integrated into health and conservation strategies.

Aceh is one of the most biodiverse coastal areas in Indonesia (Nursamsu et al. 2025). Its coastal areas are not only important as a buffer for marine and terrestrial ecosystems, but also as a living space for local communities that have a close relationship with natural resources. One important aspect of this interaction is local knowledge regarding the use of medicinal plants that has been passed down from generation to generation (Yeung et

al. 2020; Rasyidah and Hutasuht 2021). However, scientific documentation on Acehnese coastal communities' knowledge of medicinal plants is still limited. This knowledge has significant ecological, cultural, and health values (Meresa and Gatachew 2019).

In Aceh, coastal communities utilize a variety of plant species that grow wild or are cultivated in yards. Some of them are *Vitex rotundifolia*, *Litsea elliptica*, and *Acanthus ilicifolius*, which have been traditionally known to treat skin diseases, digestive disorders, and respiratory problems (Velmani et al. 2016; Wijayanti et al. 2023). The lack of systematic documentation limits both conservation efforts and opportunities to integrate local knowledge into health strategies. Closing this gap is critical, especially when coastal communities face limited access to formal health services, environmental pressures from ecosystem degradation, and new health threats emerging with climate change and globalization (Farista et al. 2021; Rideng et al. 2021). It's important to note that this situation is not unique to Aceh, but rather reflects a global pattern, where marginalized communities in developing countries rely on medicinal plants as the main pillar of health care (Hu et al. 2020).

This urgency is heightened because coastal communities are in a double vulnerable position; on the one hand, they face the limitations of modern medical facilities, while on

the other hand, they must maintain the sustainability of biological resources that sustain their daily lives (Rahman et al. 2024). Further documentation and understanding of traditional medicinal plant-based medicine practices in Aceh can provide a scientific basis for conservation policies, while strengthening public health resilience at the local level (Navia et al. 2021).

However, generational shifts present new challenges. Much traditional knowledge that was previously passed down orally is now at risk of being lost as younger generations are less likely to engage in traditional medicine practices (Ouma 2022). This highlights the need for revitalization strategies, including the integration of local knowledge into education, health promotion, and conservation. On the other hand, opportunities exist to develop Aceh's coastal plant-based bio-products, which not only contribute to public health but also to the improvement of the local economy. Education, bioactive research, and plant-based health product development can be a way to bridge traditional knowledge with modern innovation. Thus, this study aims to document the diversity of medicinal plants utilized by Aceh's coastal communities, identify their use patterns in traditional medicine practices, and formulate conservation and sustainable management strategies. This effort is expected to strengthen community health resilience while supporting the conservation of Aceh's coastal biodiversity.

## MATERIALS AND METHODS

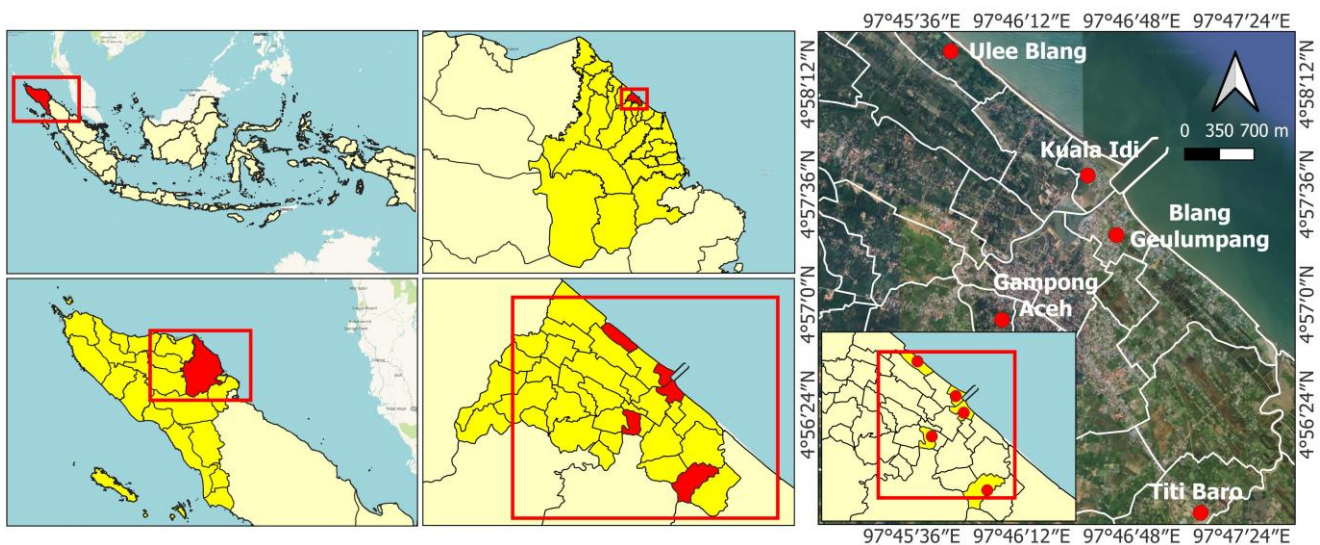
### Study area

This study was conducted in five villages in East Aceh District, Aceh Province, Indonesia (Figure 1). The GPS coordinates of each site were recorded, such as Kuala Idi (4.9617°N, 97.7760°E), Gampong Aceh (4.9486°N, 97.7682°E), Blang Geulumpang (4.9500°N, 97.7700°E), Ulee Blang (4.9450°N, 97.7750°E), and Titi Baro (4.9460°N, 97.7770°E), with an elevation ranging from 0 to 240 meters above sea level (masl) and a slope gradient between 1 and 5 degrees. The total area of East Aceh District is 6,040.60 km<sup>2</sup>, characterized by a humid tropical climate with an average annual rainfall ranging between 26.60 mm and 342.70 mm and temperatures averaging from 25°C to 32°C. This climate supports the region's biodiversity, with a population of 449,796 people, consisting of 226,269 males and 223,527 females, the majority of whom work as fishermen (coastal communities) and farmers (mountain communities) (The Central Bureau of Statistics of East Aceh District 2024) (Table 1).

**Table 1.** Study site characteristics in East Aceh District, Aceh Province, Indonesia

Village name	Ecosystem type	GPS coordinates	Distance to district capital (km)	Estimated population
Kuala Idi	Coastal forest	4.9617°N, 97.7760°E	±0 km	~5,200
Gampong Aceh	Mangrove and coastal swamp	4.9486°N, 97.7682°E	±2 km	~4,800
Blang Geulumpang	Mixed coastal vegetation	4.9500°N, 97.7700°E	±3 km	~4,500
Ulee Blang	Mangrove	4.9450°N, 97.7750°E	±2.5 km	~4,300
Titi Baro	Secondary coastal forest	4.9460°N, 97.7770°E	±2 km	~4,600

Note: The Central Bureau of Statistics of East Aceh District (2024)



**Figure 1.** Map of research area in East Aceh District, Aceh Province, Indonesia

The unique aspect of this study location lies in its intriguing geographical setting, situated within expansive coastal and mountainous areas, resulting in rich biodiversity of flora and fauna (Nursamsu et al. 2024). The abundance of medicinal plants in this region is remarkable; however, this potential has not been adequately utilized (Suwardi et al. 2021). This underutilization prompted the interest in conducting research in this location. The study was performed in September 2024, covering the villages of Kuala Idi, Gampong Aceh, Blang Geulumpang, Ulee Blang, and Titi Baro, East Aceh District, Aceh, Indonesia.

### Data collection

A total of 100 informants were collected from five villages (20 people per village) using purposive snowball sampling techniques, with priority given to individuals who had in-depth knowledge of traditional medicinal plant use, such as healers, elderly people, and local traditional leaders (Martin 1995; Albuquerque et al. 2014). The process of selecting informants was assisted by local guides to identify locations rich in plant diversity and traditional medicinal practices that are still preserved. All respondents were coastal communities of Acehnese ethnicity, aged between 15 and over 65 years, who had direct experience and knowledge passed down through generations regarding local vegetation and its use (Table 2).

In-depth interviews were conducted using a semi-structured format covering various aspects such as the types of plants used, local names, plant parts utilized (leaves, fruits, roots, seeds), processing methods, frequency of use, plant sources, and challenges faced, such as plant availability or complex processing procedures (Bernard 2017). All informants were adults who voluntarily participated in the study after being informed of the purpose, and their verbal consent was obtained prior to the interview. Ethical approval was granted by local community leaders and in accordance with regional research standards.

Interviews were conducted in a semi-structured manner using local languages, with the help of field notebooks and GPS devices. Audio recordings were used when permission was obtained from the informants. These semi-structured interviews were not only used to determine the diversity of plant species in traditional medicine practices but also to obtain a quantitative overview of the level of utilization and popularity of each species among the community. For this purpose, two ethnobotanical indices were calculated: Use Value (UV) and Relative Frequency of Citation (RFC). The UV index provides information on how often and how diversely a species is used based on the number of mentions by informants. At the same time, the RFC indicates the frequency with which a species is mentioned by informants in proportion to the total number of respondents. Through these calculations, a deeper understanding is gained of the plant species considered most important in the local medicinal system, both in terms of practical use and cultural significance.

Each species was documented through photographs (Hedberg and Edwards 1989; Hedberg et al. 2003). Plant names were updated based on local usage, reflecting

traditional knowledge passed down through generations (López-Patiño et al. 2022). Initial botanical identification in the field was verified through two steps: (i) online cross-checking using the Plants of the World Online database (<https://powo.science.kew.org/>) managed by the Royal Botanic Gardens, Kew (Royal Botanic Gardens 2024), and (ii) confirmation of species identity through plant specimens collected during the study. Although the specimens do not yet have official voucher numbers, their physical forms are stored at the Herbarium of Universitas Samudra, Langsa City, Aceh, as a permanent reference for taxonomic verification and future scientific research.

### Data analysis

#### *Use Value (UV)*

Use Value is a quantitative index used to evaluate the relative usefulness of a plant in a research area. It aims to indicate which plants have the most significant benefits, helping to identify the plants with the greatest utility in that region. The use value is calculated using the formula:

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

Where:

U : Number of reports mentioning the use of that species

N : Total number of informants

The higher the Use Value (UV), the more the plant species is primarily used in daily life (Tardío and Pardo-de-Santayana 2008).

#### *Relative Frequency of Citation (RFC)*

Relative Frequency of Citation (RFC) was developed by Tardío and Pardo-de-Santayana (2008), which shows the local importance of each species, where the higher the RFC value, the more popular a plant is, which results from the equation:

$$RFC = \frac{FC}{N}$$

Where:

FC : Number of informants who mentioned the species

N : Number of informants

This formula helps researchers determine how often a species is recognized or used by a population, providing insights into its cultural importance, medicinal relevance, or ecological value. A higher RFC number indicates that the species is well-known or commonly used by informants, possibly reflecting its significance in local customs or practices. This statistic is very important for identifying priority species in traditional knowledge systems and guiding conservation efforts activities.

#### *Informant Consensus Factor (ICF)*

The Informant Consensus Factor (ICF) is calculated using the formula:

$$ICF = \frac{(Nur - Nt)}{(Nur - 1)}$$

Where:

Nur : Total number of use-reports in a disease category

Nt : Number of medicinal plant species used for that category (Trotter and Logan 1986)

In the context of medicinal plant use, ICF analysis is used to measure the level of agreement among informants regarding the choice of plant species to treat a particular type of disease. A high ICF value (close to 1) indicates that most informants mention the same species for a particular disease category. This reflects strong collective knowledge, as well as the perception that the species has been traditionally proven effective. Conversely, a low ICF value indicates that communities use a variety of species for the same disease category, which may reflect differences in local practices, experimentation, or a lack of consensus on the specific effectiveness of a plant. In this study, high ICF values in almost all disease categories indicate that coastal communities in Aceh have a high level of confidence and consistency in selecting medicinal plants for traditional treatments. This is an important indication that existing ethnobotanical knowledge is strong, stable, and worthy of being used as a foundation for further development, both in the fields of conservation and locally-based phytopharmaceuticals.

#### *Simpson's Diversity Index*

Simpson's diversity index is one method of measuring species diversity in an ecological community, considering the number of species and the relative proportion of each species (Simpson 1949; Magurran 2004). This index calculates the probability that two individuals taken at random from the community are of different species. The formula used is:

$$D = \frac{1}{\sum \left(\frac{n}{N}\right)^2}$$

Where:

$n$  : Number of individuals per species and  $N$  is the total individuals of all species

$D$  values range from 0 to 1. Values close to 1 indicate high diversity and a relatively even distribution of species, while values close to 0 indicate dominance by a few species. This index is very useful in ethnobotanical and conservation research, as it reflects the stability and complexity of ecosystems, including the diversity of plants utilized in yards.

#### *Shannon-Wiener Index*

The Shannon-Wiener Index is one of the most commonly used diversity indices to describe the diversity of species in a community (Shannon and Weaver 1948). This index takes into account both the number of species (richness) and the relative abundance of each species (evenness). The formula:

$$H' = -\sum (p_i \times \ln p_i)$$

Where:

$p_i$  : Proportion of individuals of species  $i$  to the total population

A high value of  $H'$  indicates high diversity, with a relatively even distribution of individuals among species.

## RESULTS AND DISCUSSION

### **Socio-demographic characteristics**

A total of 100 respondents were interviewed during the study conducted in 5 villages in East Aceh District, consisting of 30 males (30%) and 70 females (70%), aged

between 15 to >65 years. The majority of them had a primary education level (29%). In comparison, the percentages of other education levels (No Schooling, Elementary School, Junior High School, Senior High School, University, and No Formal Education) were 15%, 29%, 25%, 22%, and 9%, respectively (Table 2).

Based on the results of the Percentage of Citation of Taxa (PCT) analysis, there were 55 families of medicinal plants with a total of 125 citations from all respondents. The Poaceae family showed the highest citation rate with 10 citations (8.0%), indicating that members of this family are the most well-known and widely used group of plants by the community. The high PCT in Poaceae can be attributed to its abundant availability and widespread use in traditional medicine. The Fabaceae family ranked second with 8 citations (6.4%), followed by Asteraceae and Cucurbitaceae, each with 6 citations (4.8%). These families are generally known to have various species with secondary metabolites that have potential medicinal properties, so they are often used in traditional medicine practices. Several other families, such as Phyllanthaceae, Piperaceae, and Solanaceae, each recorded 5 citations (4.0%), indicating a significant level of utilization. Meanwhile, Acanthaceae, Arecaceae, Lamiaceae, and Zingiberaceae have the same PCT value of 3.2%, indicating a moderate role in the traditional medicine system of the local community. Specifically for the Zingiberaceae family, despite its moderate PCT value, this family is widely known as an important source of medicinal plants with a variety of therapeutic uses. In contrast, most other families show relatively low PCT values ( $\leq 2.4\%$ ), with as many as 28 families having only one citation (0.8%). The low PCT values for these families indicate that medicinal plants from this group are less commonly used or known only to a small proportion of respondents. This may be due to limited distribution, specific local knowledge, or situational use.

### **Types of coastal medicinal plants**

A total of 125 taxa of mangrove plants, consisting of 55 families. The plants were recorded as being utilized by coastal communities in East Aceh District, Aceh, Indonesia (Table 3, Figure 2).

**Table 2.** Demographic structure of respondents in Aceh Timur, Aceh District, Indonesia

Parameter	Specification	Frequency	Percentage
Gender	Male	30	30
	Female	70	70
Age	15-25	8	8
	26-35	17	17
	36-45	28	28
	46-55	15	15
	56-65	13	13
	>65	19	19
Education	No Schooling	15	15
	Elementary School	29	29
	Junior High School	25	25
	Senior High School	22	22
	University	9	9

**Table 3.** Documentation of medicinal plant species in the coastal areas of East Aceh, Indonesia, based on community knowledge

Family	Scientific name	Local name	Habits	Plant status	Parts used	Benefits of treatment	Processing method	UV	RFC
Acanthaceae	<i>Acanthus ebracteatus</i> Vahl	<i>Jeruju</i>	Herb	Wild	Leaf, Flower	Hepatitis	Squeeze it, then squeeze it and filter the water then drink it	0.49	0.62
	<i>Clinacanthus nutans</i> (Burm.fil.) Lindau	<i>Peuding puteh</i>	Shrubs	Wild	Leaf	Fever, give birth to	Cut it into small pieces and put it in water then drink it	0.62	0.69
	<i>Justicia gendarussa</i> Burm.fil.	<i>Peuding itam</i>	Shrubs	Wild	Leaf	Fever, give birth to	Cut it into small pieces and put it in water then drink it	0.61	0.56
	<i>Rhinacanthus nasutus</i> (L.) Kuntze	<i>Oeun sikurap</i>	Bush	Wild	Leaf	Ringworm, itch	Squeeze it and rub it on the area affected by ringworm and itching	0.81	0.9
Amaranthaceae	<i>Amaranthus spinosus</i> L.	<i>Bayam duro</i>	Herb	Wild	Leaf	Liver, diarrhea	Squeeze it, then squeeze it and filter the water then drink it	0.65	0.62
	<i>Celosia argentea</i> L.	<i>Bungong bayam</i>	Herb	Cultivation	Leaf	Hypertension	Finely ground it, squeeze it and filter the water then drink it	0.47	0.93
Amaryllidaceae	<i>Allium cepa</i> L.	<i>Bawang mirah</i>	Herb	Cultivation	Rhizome	Cough, itch throat	Grind it and then rub it on the neck	0.33	0.82
	<i>Allium sativum</i> L.	<i>Bawang puteh</i>	Herb	Cultivation	Rhizome	Pneumothorax	Consumed directly	0.48	0.89
	<i>Crinum asiaticum</i> L.	<i>Bungong babakong</i>	Herb	Cultivation	Leaf, Fruit	Wound, bruised, rheumatism	Cut it into small pieces and put it in water then drink it	0.42	0.71
Anacardiaceae	<i>Lannea nigritana</i> (Scott Elliot) Keay	<i>Karundong pageu</i>	Herb	Wild	Bark	Diarrhea, dysentery	Pound it then kneads it and filter the water then drink it	0.55	0.64
	<i>Mangifera foetida</i> Lour.	<i>Mancang</i>	Tree	Cultivation	Fruit	Diarrhea	Consumed directly	0.51	0.53
	<i>Spondias dulcis</i> Parkinson	<i>Kerundong</i>	Tree	Cultivation	Fruit	Anemia	Consumed directly	0.41	0.7
Annonaceae	<i>Annona muricata</i> L.	<i>Drien landa</i>	Tree	Cultivation	Leaf	Pediculus humanus capitis	Squeeze then strain the water and wash your hair with the water	0.5	0.82
Apiaceae	<i>Centella asiatica</i> (L.) Urb.	<i>Pegaga</i>	Herb	Cultivation	Leaf	Cough	Squeeze it, then squeeze it and filter the water then drink it	0.49	0.49
Arecaceae	<i>Areca catechu</i> L.	<i>Pineung</i>	Palm	Cultivation	Seed	Gastric ulcer, hepatitis, itch	Chew and drink the essence of the water	0.74	0.96
	<i>Arenga pinnata</i> (Wurmb) Merr.	<i>Bak ijok</i>	Palm	Wild	Fruit	Diabetes	Squeeze it, then squeeze it and filter the water then drink it	0.49	0.9
	<i>Cocos nucifera</i> L.	<i>Bak u</i>	Palm	Cultivation	Fruit, Root	Fever, measles	Consumed directly	0.92	0.96
Asparagaceae	<i>Nypa fruticans</i> Wurmb	<i>Nipah</i>	Palm	Wild	Leaf	Hepatitis	Chew the dried leaves and drink the essence only	0.47	0.92
	<i>Cordyline fruticosa</i> (L.) A.Chev.	<i>Oeun silaklak</i>	Shrubs	Wild	Leaf	Fever, deep heat	Cut it into small pieces and put it in water then drink it	0.56	0.89
Aspleniaceae	<i>Dracaena angustifolia</i> (Medik.) Roxb.	<i>Oeun silaklak puteh</i>	Shrubs	Wild	Leaf	Fever, deep heat	Cut it into small pieces and put it in water then drink it	0.67	0.41
	<i>Thelypteris afra</i> (Christ) C.F.Reed	<i>Oeun paku</i>	Bush	Wild	Leaf	Fever	Squeeze it then filter the water and drink it	0.52	0.54
Asteraceae	<i>Adenostemma viscosum</i> J.R.Forst. & G.Forst.	<i>Oeun carik babi</i>	Shrubs	Wild	Leaf	Cough with phlegm	Squeeze it then filter it and drink the water	0.54	0.94
	<i>Ageratum conyzoides</i> L.	<i>Bungong puteh</i>	Bush	Wild	Leaf	Itch	Crumple the leaves and then rub them on the itch area	0.51	0.91

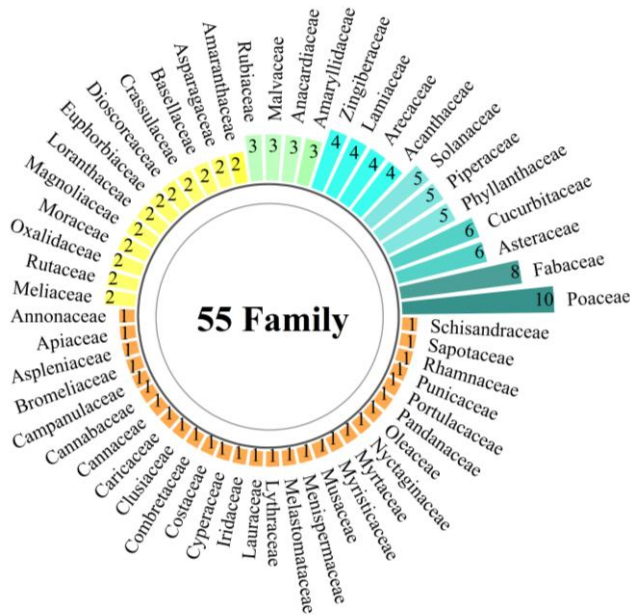
	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	<i>Oeun tuba-tuba</i>	Shrubs	Wild	Leaf	Gastritis, wound	Finely ground it, squeeze it and filter the water then drink it, for wounds, squeeze out the water and drip it on the wound.	0.57	0.51
	<i>Gynura japonica</i> (Thunb.) Juel	<i>Oeun inggu</i>	Herb	Wild	Leaf	Malaria	Boil it and then drink the water	0.46	0.94
	<i>Pluchea indica</i> (L.) Less.	<i>Capa</i>	Shrubs	Wild	All Parts	Give birth to, gastritis, hepatitis	Boil it and then drink the water	0.51	0.68
Basellaceae	<i>Tagetes erecta</i> L.	<i>Bungong ek manok</i>	Herb	Cultivation	Flower	Common cold	Squeeze it and rub it on the child's stomach	0.43	0.89
	<i>Basella alba</i> L.	<i>Limayong</i>	Creepers	Cultivation	Leaf	Gastritis	Squeeze it, then squeeze it and filter the water then drink it	0.5	0.51
	<i>Bidens pilosa</i> L.	<i>Bungong bu kulah</i>	Herb	Wild	All Parts	Cough	Squeeze it, then squeeze it and filter the water then drink it	0.47	0.59
Bromeliaceae	<i>Ananas comosus</i> (L.) Merr.	<i>Aneuh</i>	Bush	Cultivation	Fruit	Hernia	Consumed directly	0.48	0.91
Campanulaceae	<i>Hippobroma longiflora</i> (L.) G.Don	<i>Katarak</i>	Herb	Wild	Flower	Conjunctivitis	The sap is dripped on the affected eye	0.5	0.81
Cannabaceae	<i>Trema orientale</i> (L.) Blume	<i>Bak tepong</i>	Tree	Wild	Leaf	Deep heat, fever	Squeeze it then filter it and drink the water	0.43	0.91
Cannaceae	<i>Canna indica</i> L.	<i>Bungong si tungkoi</i>	Herb	Cultivation	Leaf, Flower	Hypertension, fever, hepatitis	Squeeze it, then squeeze it and filter the water then drink it	0.48	0.43
Caricaceae	<i>Carica papaya</i> L.	<i>Peutek</i>	Herb	Cultivation	Leaf	Diabetes, fever, malaria	Boiled then made into vegetables	0.45	0.44
Clusiaceae	<i>Garcinia xanthochymus</i> Hook.fil. ex J.Anderson	<i>Bak kandeh</i>	Tree	Cultivation	Leaf	Itch, nosebleed	Finely grind the plant and then apply it to the itch area	0.69	0.94
Combretaceae	<i>Combretum indicum</i> (L.) DeFilipps	<i>Bungong ie mata penganten</i>	Creepers	Cultivation	Leaf	Helminths	Cut it into small pieces and put it in water then drink it	0.45	0.83
Costaceae	<i>Hellenia speciosa</i> (J.Koenig) S.R.Dutta	<i>Sitawa</i>	Herb	Wild	Leaf	Gastritis	Cut it into small pieces and put it in water then drink it	0.41	0.89
Crassulaceae	<i>Bryophyllum pinnatum</i> (Lam.) Oken	<i>Si dingen gajah</i>	Herb	Cultivation	Leaf	Fever	Squeeze it then filter it and drink the water	0.57	0.57
Cucurbitaceae	<i>Kalanchoe pinnata</i> (Lam.) Pers.	<i>Si dingen</i>	Herb	Cultivation	Leaf	Fever	It is wilted by gently hitting it and then placing it on the child's forehead	0.48	0.68
	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	<i>Timon brouk</i>	Creepers	Cultivation	Fruit	Deep heat	Grate it, then filter the starch from the water, then add a little sugar and drink it	0.37	0.8
	<i>Cucumis melo var. reticulatus</i> Naudin	<i>Timon gapu</i>	Creepers	Cultivation	Fruit	Hypertension, deep heat	Grate it, then filter the starch from the water, then add a little sugar and drink it	0.75	0.78
	<i>Cucumis melo</i> L.	<i>Melon</i>	Creepers	Cultivation	Fruit	Hypertension	Grate it, then filter the starch from the water, then add a little sugar and drink it	0.31	0.86
	<i>Cucumis sativus</i> L.	<i>Timon</i>	Creepers	Cultivation	Fruit	Hypertension, deep heat	Grate it, then filter the starch from the water, then add a little sugar and drink it	0.67	0.95
	<i>Lagenaria siceraria</i> (Molina) Standl.	<i>Labu aie</i>	Creepers	Wild	Fruit	Fever	Squeeze it then drink it	0.51	0.5
Cyperaceae	<i>Luffa acutangula</i> (L.) Roxb.	<i>Peria</i>	Creepers	Cultivation	Fruit	Helminths	Boiled as a vegetable	0.43	0.37
	<i>Cyperus rotundus</i> L.	<i>Naleung sambo</i>	Bush	Wild	Leaf, Flower	Cough	Cut it into small pieces and put it in water then drink it	0.24	0.81
Dioscoreaceae	<i>Dioscorea alata</i> L.	<i>Gadong angen</i>	Creepers	Wild	Bulbs	Hepatitis	Dry it first, then boil it and drink the water	0.21	0.45
	<i>Dioscorea hispida</i> Dennst.	<i>Gadong tanoh</i>	Creepers	Wild	Bulbs	Hepatitis	Dry it first, then boil it and drink the water	0.46	0.83
Euphorbiaceae	<i>Mallotus paniculatus</i> (Lam.) Müll.Arg.	<i>Balek angen</i>	Tree	Wild	Leaf	Fever, cephalgia	Squeeze it then filter it and drink the water	0.5	0.68
	<i>Ricinus communis</i> L.	<i>Bak nawah</i>	Shrubs	Wild	Leaf, Sap	Wound, hernia	Cut it into small pieces and put it in water	0.8	0.69

Fabaceae	<i>Adenanthera pavonina</i> L.	<i>Si bayi</i>	Tree	Wild	Leaf	Gastritis	then drink it, for wounds The sap is dripped on the wound.	0.43	0.91	
	<i>Archidendron pauciflorum</i> (Benth.) I.C.Nielsen	<i>Jengkol</i>	Tree	Cultivation	Fruit	bladder stone	Squeeze it, then squeeze it and filter the water then drink it	0.48	0.5	
	<i>Erythrina subumbrans</i> (Hassk.) Merr.	<i>Dadap</i>	Tree	Wild	Leaf	Hepatitis	Consumed directly	0.43	0.95	
	<i>Leucaena leucocephala</i> (Lam.) de Wit	<i>Patai cina</i>	Tree	Cultivation	Bark	Cephalgia, low back pain	Cut it into small pieces and put it in water then drink it	0.83	0.77	
	<i>Mimosa pudica</i> L.	<i>Putri malu</i>	Bush	Wild	Leaf	Conjunctivitis	Scrape off the bark then mix with whiting water then apply to the affected area	0.32	0.49	
	<i>Pachyrhizus erosus</i> (L.) Urb.	<i>Bengkluang</i>	Creepers	Cultivation	Bulbs	Deep heat	Squeeze the sap into the affected eye	0.2	0.63	
	<i>Senna alexandrina</i> Mill.	<i>Oeun geulinggang</i>	Shrubs	Wild	Leaf	Scabies, ringworm, leprosy	Cut it into small pieces and put it in water then drink it	0.61	0.92	
Iridaceae	<i>Eleutherine bulbosa</i> (Mill.) Urb.	<i>Bawang batak</i>	Herb	Cultivation	Rhizome	Rheumatism, Gout	Crumple the leaves and then rub them on the area affected by ringworm	0.7	0.41	
Lamiaceae	<i>Clerodendrum chinense</i> (Osbeck) Mabb.	<i>Bungong bale</i>	Shrubs	Wild	Flower	Sore throat, stomatitis	Grind it and then rub it on the sore spot	0.71	0.77	
	<i>Coleus amboinicus</i> Lour.	<i>Jintan</i>	Herb	Wild	Leaf	Cholesterol	Squeeze it, then squeeze it and filter the water then drink it	0.48	0.59	
	<i>Ocimum tenuiflorum</i> L.	<i>Ouen semanggi</i>	Shrubs	Cultivation	Leaf	Fever	Squeeze it, then squeeze it and filter the water then drink it	0.49	0.82	
	<i>Plectranthus purpuratus</i> Harv.	<i>Oeun peuladang</i>	Shrubs	Cultivation	Leaf	Gastritis, hemorrhoids, hepatitis	Boil it and then drink the water	0.41	0.88	
Lauraceae	<i>Persea americana</i> Mill.	<i>Pokat</i>	Tree	Cultivation	Fruit	Conjunctivitis, constipation	Stomachache	Consumed directly	0.58	0.83
Loranthaceae	<i>Macrosolen cochinchinensis</i> (Lour.) Tiegh.	<i>Seumalu</i>	Epiphyte	Wild	Leaf	Stomachache	Boil it and then drink the water	0.43	0.8	
	<i>Scurrula ferruginea</i> (Roxb. ex Jack) Danser	<i>Seumalu kupi</i>	Epiphyte	Wild	Leaf	Cancer	Grind it and then rub it on the afternoon spot	0.38	0.71	
Lythraceae	<i>Lawsonia inermis</i> L.	<i>Gaca</i>	Shrubs	Cultivation	Leaf	Gastritis	Grind it finely and then stick it on the broken, bloated, sprained part	0.4	0.94	
Magnoliaceae	<i>Magnolia × alba</i> (DC.) Figlar	<i>Sulanga</i>	Tree	Cultivation	Flower	Conjunctivitis	Cut it into small pieces and put it in water then splash it into your eyes	0.14	0.9	
	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	<i>Jeumpa</i>	Tree	Cultivation	Flower	Gastritis	Cut it into small pieces and put it in water then drink it	0.5	0.93	
Malvaceae	<i>Durio zibethinus</i> Murray	<i>Drien</i>	Tree	Cultivation	Fruit	Anemia	Consumed directly	0.45	0.52	
	<i>Hibiscus arnottianus</i> A.Gray	<i>Bungong rayo puteh</i>	Shrubs	Cultivation	Leaf	Hemoptisis	Squeeze it then filter the water and drink it	0.43	0.66	
	<i>Hibiscus rosa-sinensis</i> L.	<i>Bungong rayo mirah</i>	Shrubs	Cultivation	Leaf	Hemoptisis	Squeeze it then filter the water and drink it	0.36	0.52	
Melastomataceae	<i>Melastoma malabathricum</i> L.	<i>Boh bee</i>	Shrubs	Wild	Leaf	Give birth to	Squeeze it then filter it and drink the water	0.41	0.63	
Meliaceae	<i>Lansium domesticum</i> Corrêa	<i>Langsat</i>	Tree	Cultivation	Bark	Malaria	The bark of the tree is beaten, then boiled and the water is drunk	0.47	0.92	
	<i>Xylocarpus granatum</i>	<i>Nireh bungong</i>	Tree	Cultivation	Leaf	Fever, Malaria	Cut it into small pieces and put it in water	0.67	0.92	

	J.Koenig								
	<i>Xylocarpus</i> sp. J.Koenig	<i>Bak nireh</i>	Tree	Cultivation	Leaf	Fever, Malaria	then drink it Cut it into small pieces and put it in water then drink it	0.72	0.93
Menispermaceae	<i>Cyclea barbata</i> Miers	<i>Oeun tampok teungah</i>	Creepers	Wild	Leaf	Fever, measles	Cut it into small pieces and put it in water then drink it	0.55	0.41
Moraceae	<i>Ficus racemosa</i> L.	<i>Ara</i>	Tree	Wild	Sap	Bee sting	The leaf sap is rubbed on the part that was stung by the bee	0.49	0.77
	<i>Ficus racemosa</i> Willd.	<i>Ara tanoh</i>	Tree	Wild	Sap	Bee sting	The leaf sap is rubbed on the part that was stung by the bee	0.43	0.66
Musaceae	<i>Musa acuminata</i> Colla	<i>Pisang aben</i>	Herb	Cultivation	Fruit	Fever, smallpox, malaria	The contents of the banana are dredged and mashed and then placed on the forehead	0.47	0.52
Myristicaceae	<i>Myristica fragrans</i> Houtt.	<i>Boh pala</i>	Tree	Cultivation	Seed	Flatulence, fracture, sprain	Grind it finely and then stick it on the broken, bloated, sprained part	0.44	0.63
Myrtaceae	<i>Psidium guajava</i> L.	<i>Jambe kluto</i>	Tree	Cultivation	Leaf	Stomatitis	Chew and drink the essence of the water	0.4	0.92
Nyctaginaceae	<i>Mirabilis jalapa</i> L.	<i>Bungong suboh</i>	Herb	Cultivation	Leaf, Flower	Gastritis	Squeeze it then filter it and drink the water	0.43	0.69
Oleaceae	<i>Jasminum sambac</i> (L.) Aiton	<i>Bungong melur</i>	Shrubs	Cultivation	Leaf	Deep heat	Squeeze it then filter the water and drink it	0.39	0.54
Oxalidaceae	<i>Averrhoa bilimbi</i> L.	<i>Geulimeng</i>	Tree	Cultivation	Fruit	Hypertension	Consumed directly	0.42	0.88
	<i>Averrhoa carambola</i> L.	<i>Geulimeng sago</i>	Tree	Cultivation	Fruit	Dengue, diarrhea	Consumed directly	0.77	0.87
Pandanaceae	<i>Pandanus amaryllifolius</i> Roxb. ex Lindl.	<i>Sike musang</i>	Herb	Wild	Leaf	Fever, hypertension	Cut it into small pieces and put it in water then drink it	0.89	0.7
Phyllanthaceae	<i>Breynia androgyna</i> (L.) Chakrab. & N.P.Balacr.	<i>Ouen nasi-nasi</i>	Shrubs	Wild	Leaf	Malnutrition	Grind it finely and apply it to the solar plexus	0.42	0.95
Phyllanthaceae	<i>Phyllanthus acidus</i> (L.) Skeels	<i>Boh seri</i>	Tree	Wild	Fruit	Stomatitis	Consumed directly	0.24	0.37
Phyllanthaceae	<i>Phyllanthus buxifolius</i> (Blume) Müll.Arg.	<i>Oeun sikilie</i>	Shrubs	Wild	Leaf	Fracture, sprain	Grind it finely and apply it to the broken bone	0.57	0.81
	<i>Phyllanthus niruri</i> L.	<i>Tingkuo aneuk</i>	Herb	Wild	All Parts	Gastritis, common cold, diabetes	Dry it first, then boil it and drink the water	0.62	0.62
Piperaceae	<i>Piper betle</i> L.	<i>Ranup</i>	Creepers	Cultivation	Leaf	Fever, wound, itch	Make it into betel lime and consume it, then swallow the water and spit it out, then rub it on the injured part and Itch-Itchy	0.52	0.98
	<i>Piper hispidum</i> Sw.	<i>Mane</i>	Tree	Wild	Leaf	Fever	It is wilted in the fire, then squeezed and placed on the stomach which has been smeared with whiting water	0.45	0.68
	<i>Piper nigrum</i> L.	<i>Lada</i>	Creepers	Cultivation	Fruit	Give birth to	Finely ground and mixed with Majun (food for mothers giving birth)	0.44	0.69
	<i>Piper ornatum</i> N.E.Br.	<i>Ranup mirah</i>	Creepers	Wild	Leaf	Itch	Finely grind the plant then apply it to the itch area	0.41	0.91
	<i>Piper sarmentosum</i> Roxb.	<i>Ranup ie</i>	Shrubs	Wild	Leaf	Itch, nosebleed	Finely grind the plant and then rub it on the itch area. For nosebleeds, squeeze it and then plug it into the nose.	0.67	0.74
Poaceae	<i>Bambusa vulgaris</i> Schrad. ex J.C.Wendl.	<i>Tring gadeng</i>	Bush	Cultivation	Stem	Stomachache	Boil it and then drink the water	0.38	0.84
	<i>Cymbopogon citratus</i> (DC.) Stapf	<i>Bak areu</i>	Bush	Cultivation	Leaf, Stem	sore throat, stomatitis, hypertension	Crush it then put it in warm water and drink it	0.34	0.6
	<i>Dendrocalamus asper</i>	<i>Tring</i>	Bush	Cultivation	Stem	Stomachache	Boil it and then drink the water	0.41	0.88

	(Schult.f.) Backer									
	<i>Imperata cylindrica</i> (L.) Raeusch.	<i>Oeun padang</i>	Bush	Wild	Leaf, Root	Common cold	Boil it and then drink the water	0.42	0.51	
	<i>Lophatherum gracile</i> Brongn.	<i>Mimilang</i>	Bush	Wild	Leaf	Sore throat	Squeeze it then filter it and drink the water	0.51	0.62	
	<i>Oryza sativa</i> L.	<i>Pade</i>	Bush	Cultivation	Seed	Fever	Roasted then soaked in water and drink the water	0.32	0.98	
	<i>Oryza sativa</i> var. <i>glutinosa</i> (Lour.) Körn.	<i>Pade leukat</i>	Bush	Cultivation	Seed	Tetanus	Cook it while it's warm then stick it on the chart that is hit by a rusty nail	0.42	0.43	
	<i>Saccharum officinarum</i> L.	<i>Tube beutong</i>	Bush	Wild	Stem	Conjunctivitis	The dregs are roasted until charred, then mixed with whiting water and rubbed on the affected eye area	0.37	0.77	
	<i>Saccharum robustum</i> E.W.Brandes & Jeswiet ex Grassl	<i>Tube ubat</i>	Bush	Wild	Stem	Conjunctivitis	The dregs are roasted until charred, then mixed with whiting water and rubbed on the affected eye area	0.4	0.66	
	<i>Zea mays</i> L.	<i>Jagong</i>	Bush	Cultivation	Fruit	Fever, measles	Roasted then soaked in water and drink the water	0.58	0.41	
Portulacaceae	<i>Portulaca oleracea</i> L.	<i>Oeun sumpuong</i>	Bush	Wild	All Parts	Liver	Boil it and then drink the water	0.33	0.77	
Punicaceae	<i>Punica granatum</i> L.	<i>Geulima</i>	Shrubs	Cultivation	Fruit	Diarrhea	Consumed directly	0.48	0.62	
Rhamnaceae	<i>Colubrina asiatica</i> (L.) Brongn.	<i>Pilaot</i>	Shrubs	Cultivation	Leaf	Fever, measles	Cut it into small pieces and put it in water then drink it	0.35	0.53	
Rubiaceae	<i>Coffea</i> sp. L.	<i>Kupi</i>	Tree	Cultivation	Fruit, Leaf	Anemia	Consumed directly, The fruit is roasted and then the powder is added to water and drunk.	0.4	0.63	
	<i>Morinda citrifolia</i> L.	<i>Keumude</i>	Tree	Cultivation	Fruit	Gastritis, give birth to	Boil it and then drink the water	0.57	0.73	
	<i>Myrmecodia pendens</i> Merr. & L.M.Perry	<i>Bayeuk bireng</i>	Epiphyte	Wild	Stem	Cough	Boil it then filter it and drink the water	0.48	0.52	
Rutaceae	<i>Citrus × amblycarpa</i> (Hassk.) Ochse	<i>Sundee</i>	Tree	Cultivation	Fruit	Gastritis, give birth to	Grind it finely and then stick it on the lower abdomen	0.71	0.59	
	<i>Citrus maxima</i> (Burm.) Merr.	<i>Asam tangkih</i>	Tree	Cultivation	Fruit	Stomatitis	Consumed directly	0.45	0.71	
Sapotaceae	<i>Manilkara zapota</i> (L.) P.Royen	<i>Sawoh</i>	Tree	Cultivation	Fruit	Hypertension, diarrhea	Consumed directly	0.55	0.8	
Schisandraceae	<i>Illicium verum</i> Hook.fil.	<i>Bungong lawang</i>	Tree	Cultivation	Fruit	Flatulence, fever	Cut it into small pieces and put it in water then drink it	0.58	0.7	
Solanaceae	<i>Datura metel</i> L.	<i>Trung pungoe</i>	Shrubs	Wild	Fruit, Leaf	dysmenorrhea, boil	Finely ground and placed on the painful area	0.52	0.83	
	<i>Nicandra physalodes</i> (L.) Gaertn.	<i>Boh keutep-keutep</i>	Herb	Wild	Fruit	Hypertension	Squeeze it then filter it and drink the water	0.38	0.84	
	<i>Nicotiana tabacum</i> L.	<i>Bakong</i>	Herb	Cultivation	Leaf	Hepatitis	Dry leaves are chewed and the essence is drunk only	0.45	0.41	
	<i>Solanum lasiocarpum</i> Dunal	<i>Trung</i>	Shrubs	Cultivation	Fruit	Diabetes	Boiled as a vegetable	0.49	0.81	
	<i>Solanum nigrum</i> L.	<i>Boh truong rimbang</i>	Shrubs	Cultivation	Fruit	Conjunctivitis	Boiled as a vegetable	0.45	0.62	
	<i>Capsicum frutescens</i> L.	<i>Campli cut</i>	Shrubs	Cultivation	Leaf	Hair growth	Squeeze it and then rub it on the baby's newly shaved head	0.36	0.84	
Zingiberaceae	<i>Alpinia galanga</i> (L.) Willd.	<i>Lengkuweuh</i>	Herb	Cultivation	Bulbs	Cough, fever, flatulence, stomachache	Crush it then put it in warm water and drink it	0.78	0.98	
	<i>Curcuma aeruginosa</i> Roxb.	<i>Kunyet gajah</i>	Herb	Cultivation	Rhizome	Gastritis, leprosy, Itch	Grind it then filter it and drink the water, for itch just apply it	0.48	0.75	

<i>Curcuma longa</i> L.	<i>Kunyet</i>	Herb	Cultivation Rhizome	Give birth to	Grind it finely then brew it with warm water and add honey and then drink it	0.25	0.93
<i>Kaempferia galanga</i> L.	<i>Alia</i>	Herb	Cultivation Leaf, Rhizome	Fever, nonproductive cough	Squeeze it then filter the water and drink it	0.6	0.93
Grand total	125 Species					61.75	91.03



**Figure 2.** Family categories of medicinal plants are documented in the research

This dominance can be attributed to the adaptability of Poaceae species to diverse environmental conditions, including dry, wet, and even disturbed habitats (Khan et al. 2019; Majeed et al. 2020). It is noteworthy that the identification of observed species is relatively higher compared to previous studies conducted by Navia et al. (2022), indicating that communities in East Aceh possess in-depth knowledge of medicinal plants, using 88 different taxa from 78 genera and 46 families to treat 32 different diseases. In comparison with other ethnic groups in Indonesia, a study by Nursamsu et al. (2024) shows that the Aneuk Jamee tribe in Sumatra Island (South Aceh) has extensive knowledge of medicinal plants, utilizing over 152 taxa for the treatment of 59 known diseases. The Dayak Tamambaloh tribe in Kalimantan uses more than 29 taxa (Supiandi et al. 2023). This data indicates that the study area is rich in biodiversity. Furthermore, this high diversity aids in preserving diverse and important traditional knowledge. The large number of species found and documented also highlights that the vegetation in the study area serves as a reservoir for various medicinal plants. This underscores the practical importance of the traditional medicinal plant industry in providing essential health care needs (Zemede et al. 2024).

### Medicinal plant diversity index

The medicinal plant diversity index is an important measure for understanding the level of biological diversity in a region, particularly in relation to local knowledge and how plants are used for medicine. This index, similar to Simpson's Diversity Index (Simpson 1949) and the Shannon-Wiener Index (Shannon and Weaver 1948), shows how many different types of medicinal plants are known and used by people in a particular area. A higher value of the index means there is a greater variety of

medicinal plant species, which suggests more natural resources are available and that local people have a deeper understanding of how to use plants for health purposes (Table 4).

The analysis showed that the diversity of medicinal plants in the five study areas was very high. The Simpson's index values ranged from 0.9918 to 0.9920, indicating that no single species dominated and that most species had similar proportions. At the same time, the Shannon-Wiener Index ( $H'$ ) values were between 4.813 and 4.823, reflecting a high level of species diversity and an even distribution of species. These high index values suggest that people in the coastal regions of East Aceh possess broad and balanced knowledge of the medicinal plants around them. This knowledge could be useful for traditional medicine and protecting local biodiversity.

### Vegetation composition based on habit

The results of vegetation identification show 9 habitat groups with a total of 125 species. The most dominant habitats are herbs and trees, each with 29 species (23.2%), cumulatively reaching 46.4% of the total species. Shrubs ranked next with 26 species (20.8%), followed by bushes with 17 species (13.6%) and creepers with 15 species (12.0%). Habits with low frequency include palms with 4 species (3.2%), epiphytes with 3 species (2.4%), and mangrove trees (*Xylocarpus* spp.) with 2 species (1.6%). Overall, woody plants (trees, shrubs, bushes, palms) numbered 76 species (60.8%), while non-woody plants (herbs, creepers, epiphytes) numbered 47 species (37.6%), indicating the dominance of woody vegetation at the study site (Figure 3).

### Importance index of coastal medicinal plants

The use value of coastal medicinal plants in East Aceh District, Aceh, Indonesia was calculated to assess the importance of specific plants based on their utility. The UV scores found in the study area ranged from 0.14 to 0.92. The top 10 plants with the highest use values include *C. nucifera* (0.92), followed by *P. amaryllifolius* (0.89), *L. leucocephala* (0.83), *R. nasutus* (0.81), *R. communis* (0.8), *A. galanga* (0.78), *A. carambola* (0.77), *C. melo* (0.75), *A. catechu* (0.74), and *Xylocarpus* sp. (0.72) (Figure 4).

Based on the questionnaire data analysis, the Relative Frequency of Citation (RFC) values for the ten plant species with the highest scores were obtained. The RFC values ranged from 0.37 to 0.98, indicating a very high level of recognition and utilization by the community. Three species, namely *A. galanga*, *O. sativa*, and *P. betle*, ranked highest with a maximum RFC value of 0.98. They are followed by *A. catechu* with a value of 0.96, *C. nucifera* also with 0.96, then *B. androgyna*, *C. sativus*, and *E. subumbrans* each with a score of 0.95, as well as *A. viscosum* and *G. japonica* with a score of 0.94. These high RFC scores indicate a very high level of recognition and utilization by the community, with complete data presented in Figure 5.

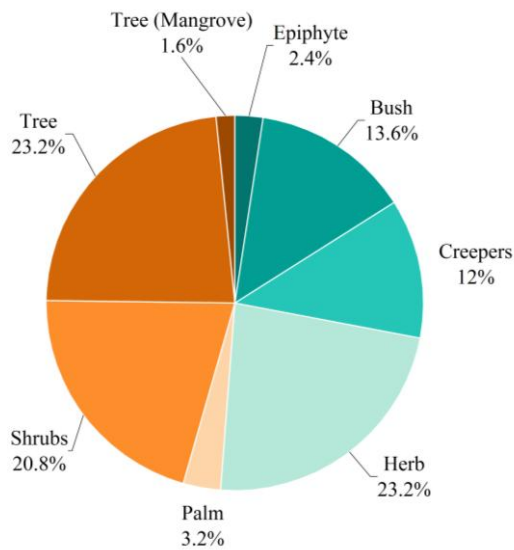


Figure 3. Percentage of vegetation composition based on habit

**Medicinal plants utilization analysis by disease category**

This study successfully documented the use of 125 species of medicinal plants by coastal communities in East Aceh District to treat various diseases classified based on the ICD-10 system. A total of 16 disease categories were recorded, with 11,456 reported uses and Informant Consensus Factor (ICF) values ranging from 0.98 to 1.00, indicating a very high level of agreement among informants. The disease category with the most reported uses is general symptoms and abnormal clinical findings (ICD-XVIII: R50-R69), which includes conditions such as fever, bloating, and headache, with 2,351 reported uses from 29 plant species (ICF 0.99). This category is followed by digestive system disorders (ICD-XI: K00-K93) such as gastritis and stomatitis with 1,571 reports and 22 species (ICF 0.99), and circulatory system diseases (ICD-IX: I00-I99) such as hypertension and anemia with 1,118 reports and 13 species (ICF 0.99). Two disease categories showed perfect consensus among informants, namely neoplasms/cancers (ICD-II: C00-D48) with 13 reports and 1 species (ICF 1.00), and skin and subcutaneous tissue symptoms such as hair growth (ICD-XVIII: R20-R23) with 27 reports and 1 species (ICF 1.00).

Table 4. Medicinal plant diversity index

Diversity index	Kuala Idi	Gampong Aceh	Blang Geulumpang	Ulee Blang	Titi Baro
Taxa S	125	125	125	125	125
Individuals	1798	1903	1823	1732	1847
Simpson_1-D	0.9919	0.9919	0.992	0.9918	0.9919
Shannon H	4.823	4.816	4.823	4.813	4.82

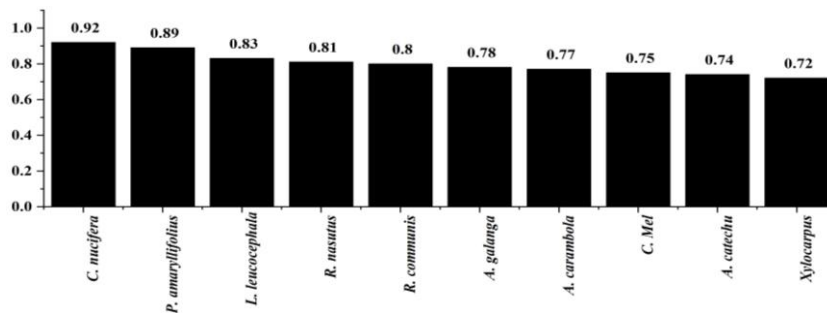


Figure 4. Highest Use Value (UV) based on respondent reports

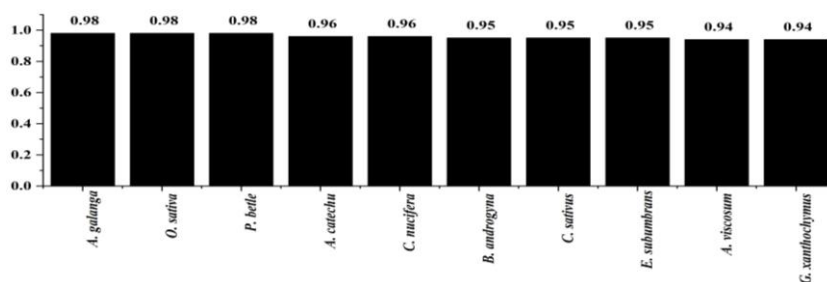


Figure 5. Highest Relative Frequency of Citation (RFC) value based on respondent reports

Other categories that also have a high level of consensus include infectious and parasitic diseases (969 reports, 13 species), respiratory disorders (999 reports, 14 species), genitourinary disorders (751 reports, 10 species), skin diseases (723 reports, 10 species), liver diseases (530 reports, 8 species), tropical diseases such as malaria and dengue (521 reports, 7 species), and injuries and external causes (527 reports, 9 species) with ICFs between 0.98-0.99. In addition, the categories of endocrine, nutritional, and metabolic diseases, such as diabetes and high cholesterol (398 reports, 5 species), and muscle and connective tissue disorders, such as rheumatism and back pain (223 reports, 3 species), also showed strong agreement (ICF 0.99). Finally, symptoms related to the respiratory and circulatory system, such as nosebleeds and coughing up blood (235 reports, 4 species) also recorded with an ICF of 0.99 (Table 5).

### Parts used

The data shows that leaves are the most widely used part of plants, with 53 types (42.4%), followed by fruit with 28 types (22.4%). Other parts that are also quite frequently used are flowers, stems, and rhizomes (5 species each; 4.0%), as well as seeds and tubers (4 species each; 3.2%). Meanwhile, the use of bark, sap, and combinations of several plant parts

is relatively less common, each below 3%. Overall, these results indicate that leaves and fruits are the most dominant parts of plants used, possibly because they are easier to obtain and process compared to other plant parts (Figure 6).

This data shows that leaves are the plant parts most often chosen by the community, possibly because of their high bioactive content and ease of processing compared to other plant parts (Hayati et al. 2021). The use of these parts is certainly based on their effectiveness and high therapeutic value in traditional medicine. Leaves, for example, are often used because they are easy to obtain, simple to process, and contain beneficial bioactive compounds (Sanchita and Sharma 2018). Fruits and flowers are also often chosen because they contain important nutrients and compounds that support the healing process. In addition, preference for certain parts is influenced by their availability in nature and ease of processing, both in fresh and dried form. Tradition, local knowledge, and practical experience passed down through generations also influence the selection process, along with clinical effectiveness. Environmental conditions and the availability of plant resources have a significant impact on the ethnobotanical knowledge of local communities (Saynes-Vásquez et al. 2014).

**Table 5.** Disease-based analysis of medicinal plant applications

ICD-10 chapter & code	Disease category	Example conditions	Number of use reports	Number of species	ICF
I: A00-B99	Infectious and parasitic diseases	Diarrhea, ringworm, helminthiasis, leprosy, scabies, dysentery, tetanus, head lice	969	13	0.99
XI: K70-K77	Liver diseases	Hepatitis, liver disorders	530	8	0.99
I: A90-A99	Vector-borne tropical diseases	Malaria, dengue fever	521	7	0.99
IX: I00-I99	Circulatory system diseases	Hypertension, anemia, hemorrhoids	1118	13	0.99
XI: K00-K93	Digestive system disorders	Gastritis, stomachache, stomatitis, hernia, constipation	1571	22	0.99
VII: H00-H59	Eye and adnexa disorders	Conjunctivitis	670	7	0.99
XIV: N00-N99	Genitourinary system disorders	Childbirth support, dysmenorrhea, bladder stones	751	10	0.99
XIII: M00-M99	Musculoskeletal & connective tissue	Low back pain, rheumatism, gout	223	3	0.99
X: J00-J99	Respiratory system disorders	Cough, common cold, sore throat, pneumothorax	999	14	0.99
XII: L00-L99	Skin and subcutaneous tissue disorders	Itching, measles, boils, smallpox	723	10	0.99
II: C00-D48	Neoplasms	Cancer	13	1	1
IV: E00-E90	Endocrine, nutritional & metabolic	Diabetes, high cholesterol	398	5	0.99
XIX: S00-T98	Injury, poisoning & external causes	Wounds, bee stings, sprains, bruises, fractures	527	9	0.98
XVIII: R00-R09	Circulatory/respiratory-related symptoms	Hemoptysis, nosebleeds	235	4	0.99
XVIII: R20-R23	Skin/subcutaneous symptoms	Hair growth	27	1	1
XVIII: R50-R69	General symptoms & abnormal findings	Fever, bloating, internal heat, headache	2351	29	0.99

Note: WHO/ ICD-10 standard classification

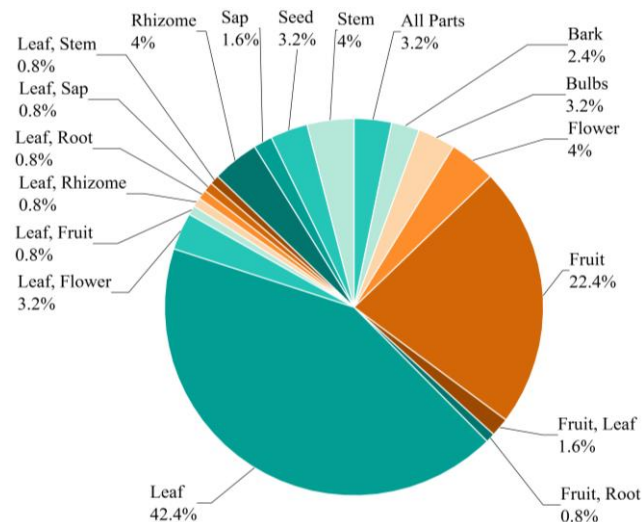


Figure 6. Parts of the plant are utilized for medicinal purposes

Furthermore, the choice of leaves as the main part used is also related to the concept of sustainability. Leaves are the main organs of plants for photosynthesis and play an important role in plant life (Li et al. 2020). The use of leaves tends not to damage the survival of plants, in contrast to roots or stems, which, if taken excessively, can cause plant death (Xu et al. 2018). This suggests that the traditional practices of coastal communities are not only medicinally oriented but also reflect conservation efforts that are aligned with the principle of sustainable use. Another influencing factor is empirical knowledge about the effectiveness of a plant part against a particular disease, which continues to be tested and adapted to environmental conditions and local community health dynamics (Benson et al. 2024). Thus, the preference for using plant parts is not a random choice, but the result of a complex interaction between health needs, resource availability, hereditary knowledge, and inherent cultural values.

**Processing methods and uses**

The most prevalent traditional techniques of preparing medicinal herbs were squeezing (23%), cutting into tiny pieces (16.7%), and boiling (16.7%). Other popular techniques include direct ingestion (13.5%) and finely ground (10.3%). Additionally, crushed finely (4.8%), grated (4%), and roasted (4%) are preferred methods. Chewing (3.2%) and crushing (1.6%) are utilized in specific situations. Wilting (0.8%), beating (0.8%), and peeling (bark of the stem) (0.8%) are three less typically utilized but equally significant processes (Figure 7).

Practices and processing processes differ by location, influenced by cultural variation and customs. Cultural exchanges and customs facilitate the spread of ethnobotanical knowledge between groups (Nursamsu et al. 2024). The most commonly used traditional treatment methods are drink (60.8%), followed by direct ingestion (10.4%), application (10.4%), spread (6.4%), cook as a vegetable (4%), drop (3.2%), rub (2.4%), plug (0.8%), sprinkle (0.8%), and wash (0.8%) are some of the less popular but still employed ways. These percentages

demonstrate how the community uses plants as medicine in basic and straightforward ways, depending on the available materials and the sort of ailment being treated (Figure 8).

**Discussion**

The results of the study show a high diversity of coastal medicinal plants in East Aceh District, reflecting the richness of the region's biological resources and its potential for traditional medicine. This pattern of diversity is consistent with findings from other Southeast Asian countries, such as Thailand, Malaysia, and the Philippines, where coastal and wetland ecosystems also harbor a wide range of species with bioactive properties (Mahali et al. 2023). Similar to these regions, the variation in species across different habitats in East Aceh supports the sustainability of traditional medicine practices by providing a diverse and resilient pool of medicinal plants for local communities.

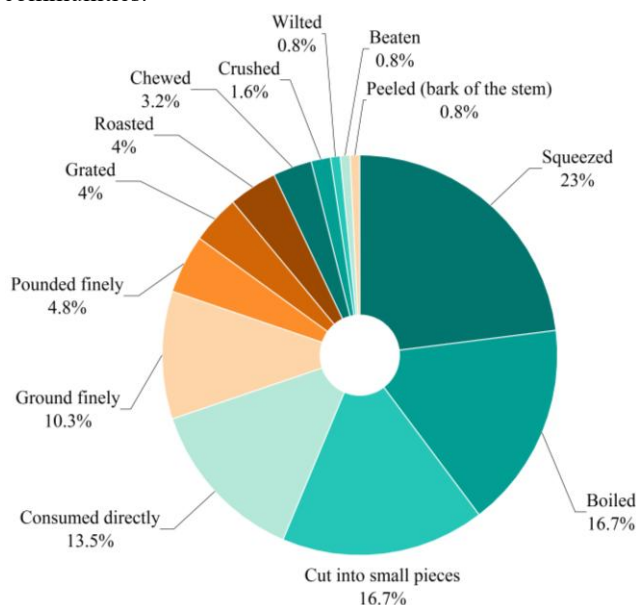


Figure 7. Traditional processing methods of medicinal plants

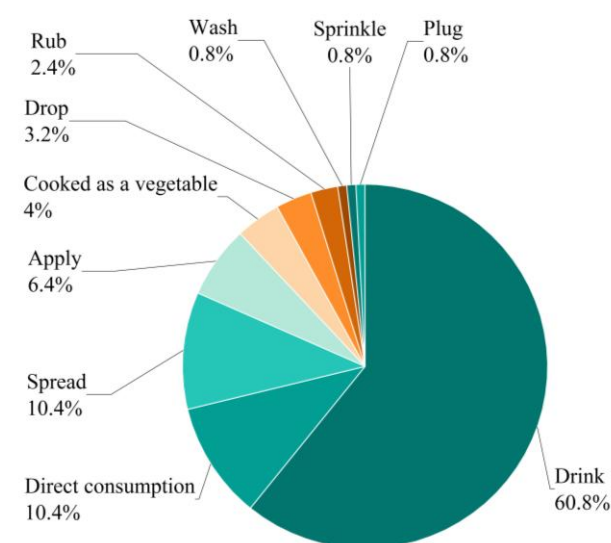


Figure 8. Therapeutic applications of medicinal plants

Several species show high Use Value (UV) and Relative Frequency of Citation (RFC), such as *C. nucifera*, indicating high levels of utilization and community agreement regarding their benefits. These species are not only used for treating common illnesses such as fever and infections but also serve dual functions as food, cultural rituals, and immune system enhancers (Newman and Cragg 2016; Chaachouay et al. 2023). High Informant Consensus Factor (ICF) values for specific disease categories indicate consistency in knowledge among informants, which in ethnomedical studies is often associated with empirically tested therapeutic efficacy (Trotter and Logan 1986).

Knowledge about the processing and use of medicinal plants in East Aceh has been passed down from generation to generation, strengthening the cultural identity of coastal communities (Mawalagedera et al. 2019; VanPool 2019; Chaachouay et al. 2023). In addition to serving as a medical alternative, medicinal plants also contribute to the preservation of local culture and traditions, where knowledge about the benefits and processing methods of these plants is passed down from generation to generation (Dutta et al. 2021). This practice aligns with global trends where local knowledge plays a crucial role in providing solutions for treating various types of diseases (Chaachouay and Zidane 2024). In the context of limited access to modern healthcare facilities, the resilience of local knowledge becomes a crucial factor for community health self-reliance (Subramoniam 2014; Chaachouay and Zidane 2024).

Although the use of medicinal plants provides significant socio-economic and health benefits, the sustainability of these resources faces serious threats, including habitat degradation, overexploitation, and climate change (Rahmawaty et al. 2021, 2022). Species with high Use Value (UV) and Informant Consensus Factor (ICF) are particularly vulnerable to overharvesting and should be prioritized in conservation planning. The use of medicinal plants in coastal communities of East Aceh is driven not only by healthcare needs but also by socio-economic factors, such as income opportunities from selling medicinal plants, their use in cultural rituals, and the added value from herbal products. To ensure the long-term availability and benefits of medicinal plants, several actionable strategies can be implemented, including habitat protection and restoration through community-managed conservation zones in coastal and wetland areas, sustainable harvesting and cultivation by promoting rotational collection and the cultivation of high-demand species in home gardens or community plots, documentation and knowledge sharing by developing local databases that include plant uses, preparation methods, and seasonal availability, integration with public health programs that combine traditional medicine with modern healthcare services, and community involvement and training in plant population monitoring, sustainable harvesting techniques, and the development of value-added products. The involvement of local communities in these strategies is not just beneficial but crucial to their success. A collaborative approach involving local communities, government agencies, and research institutions is key to

successfully implementing these strategies, ensuring that medicinal plants continue to provide health and socio-economic benefits for future generations (Ticktin 2015).

In conclusion, this study documented 125 medicinal plant taxa from 55 families used by coastal communities in East Aceh Regency, reflecting strong ethnobotanical knowledge and biodiversity value. High indices of Use Value (UV = 0.14-0.92), Relative Frequency of Citation (RFC = 0.37-0.98), and Informant Consensus Factor (ICF = 0.98-1.00) indicate consistent community consensus on traditional treatments. Urgent measures are needed to protect and sustainably manage these resources through habitat conservation, sustainable cultivation, knowledge documentation, and integration with public health programs. Collaboration between local communities, government agencies, and research institutions is essential to ensure that the benefits of medicinal plants are preserved and continue to support future generations. The study covered only five villages and did not include pharmacological or phytochemical validation. Seasonal sampling and limited specimen accessioning may also restrict representativeness. Further research should examine the bioactive compounds and pharmacological efficacy of high-use species and evaluate knowledge transmission across generations to support conservation, sustainable utilization, and integration of traditional medicine into community health programs.

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