

## RESEARCH ARTICLE



# Ethnobotany of the Malay Community in East Lingga Sub-District, Lingga District, Riau Island

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## Abstract

The Malay ethnic community in the Lingga Timur District is one example of how dependence on natural resources, particularly plants, has long existed to support human requirements. This is according to the field of ethnobotany. This study intends to identify the plants used and how the community in the East Lingga District uses plants based on local knowledge. The data were then descriptively and qualitatively assessed after being gathered through field observations and interviews with 71 respondents. There are 366 plant species from 103 known plant families found in East Lingga. Most of the families discovered belonged to the Fabaceae, including food, fuel, building supplies, ropes and crafts, medicinal plants, and other resources. Most sources for procurement are from the wild (58%), with 176 tree species, trees are the most common plant habitus. Leaves are the most frequently used plant component.

Keyword: Ethnobotany, local knowledge, plant

## 1. Introduction

Since long ago, Indonesian nations already depend on natural wealth by utilizing natural biological products for survival and necessities of life. Physical natural resources that have a role include plants and animals, which are very diverse and abundant. In its utilization, local people still use traditional methods and knowledge and experience passed down from generation to generation, commonly called local wisdom. Knowledge of the local community needs to know its relation and become a cultural asset between utilization and the role of biological resources for human life through ethnobotanical studies [1].

Ethnobotany can be interpreted as a science that studies the relationship or interaction between humans and plants in people's lives. According to Alexiades and Sheldon [2], ethnobotany is a science related to ethnic ethnicity and plants, so there are differences in the ethnobotany of a tribe with other tribes related to the knowledge and use of plants. The use of plants for the community includes food plants, traditional medicinal plants, ritual needs, spices, dyes, building materials, and other benefits [3]. Plant sources come from forest plants, wild plants outside the forest, and cultivated plants. So it is necessary to identify and collect information on the plants' types and local names, which are then documented in writing.

One of the ethnicities still maintaining local wisdom is the Malay ethnic group located in East Lingga District, Riau Archipelago. The condition of the area surrounded by the sea makes Lingga Island close to other regions. The Lingga community tends to settle down so that most of their livelihoods are fishermen and sago farmers. Sago commodities and marine resources are the most significant commodities in East Lingga, but their management is still lacking and not optimal. Besides that, using plants is still disconcerting for the community for survival. So that further information is needed about local ethnobotanical wisdom.

The purpose of this research is to identify plants that are used and to identify forms of utilization of plants based on local wisdom by the community in East Lingga District.

## 2. Materials and Methods

The research was conducted in July-August 2022 in East Lingga District, Lingga District, Riau Islands Province. Data was collected in 3 sample villages, Pekaka Village, Keton Village, and Teluk Village. The objects used in this study are plant species found and utilized by the people of East Lingga District, Riau Islands.

Data was obtained from observations or field surveys and interviews with respondents and literature study. Direct observation was carried out by systematically observing and recording [4].

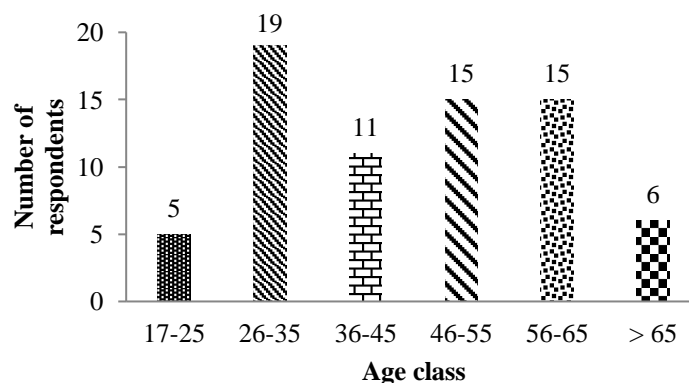
Interviews were conducted with 71 respondents from 3 villages using purposive sampling. This technique is used for respondents who know and have criteria under the research objectives. Interviews were conducted to find out and use of medicinal plants to informants, namely people believed to have an accurate understanding of medicinal plants and diseases by the surrounding community. The technique used for key informants is the snowball method, namely respondents who have been determined by community leaders and are believed to know medicinal plants [5].

Data analysis was carried out by tabulation, then analyzed descriptively and qualitatively. Data on the characteristics of the respondents include the structure of age, gender, education, and livelihoods. The utilization of plant data include percentages for family, habitus, plant usage, and source of plant usage.

## 3. Results and Discussion

### 3.1. Characteristics of Respondent's Age Structure

Ethnic community Malays in East Lingga District are a society that lives traditionally. Knowledge and utilization of resources are still preserved from generation to generation. In figure 1, the results of interviews with 71 respondents knowledge of respondents aged 26-35 who know the most about food utilization was 19 respondents. Respondents who had the most knowledge of traditional medicine aged > 56 years were five respondents in depth and understood how to use it and its benefits. According to Salsabila et al. [6] aged 41-65 years have knowledge and information about medicinal plants passed down from generation to generation. Also, in everyday life, they often use medicinal plants for health. Meanwhile, the younger generation works more in the government, so interest in medicinal plants still needs to be improved in the younger generation. However, most people know about medicinal plants that are easy to find or are cultivated plants, such as ginger, turmeric, and kencur rhizomes.



**Figure 1.** The age structure of the respondents

### 3.2. Gender

The highest use of plants was male, namely 73%. This shows that knowledge about plant species is primarily male; work and knowledge based on experience and an inheritance from ancestors is a source of knowledge about plants around the community.

### 3.3. Level of Education

Based on the level of education in the 3 sample villages in East Lingga District, they are in a low category (Figure 2). Education impacts the development of people's mindset and behavior. As many as 3 out of 5 respondents who know medicinal plants include those in elementary school (37%) and not in school (22%). According to Pieroni et al. [7], education is a developing era in meeting the needs of valuable local plants in the tropics, influencing the younger generation's involvement in preserving ancestral knowledge. However, according to Utami et al. [8], public education has little effect on people's abilities and knowledge about medicinal plants because information is passed down from generation to generation.

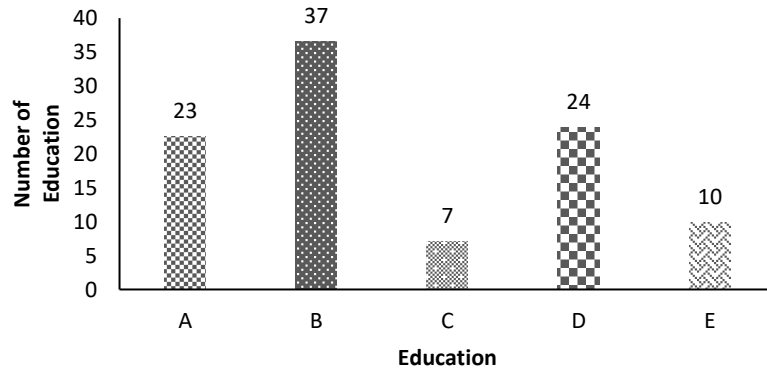


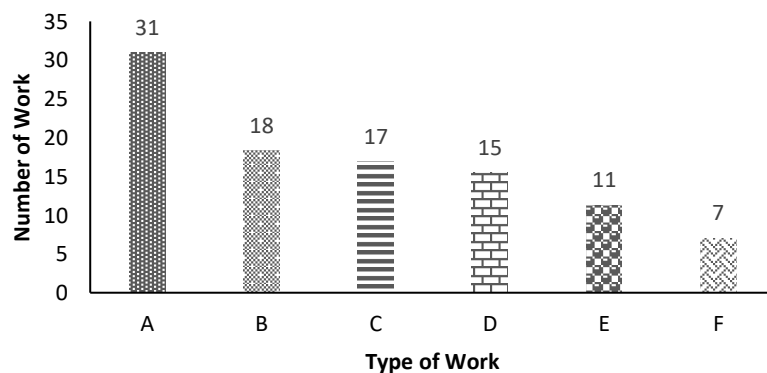
Figure 2. Education Level

information: A = No School, B = Elementary School, C= Junior Hight School, D = Senior Hight School, E = College

### 3.4. Work

Most of the East Lingga are fishermen (31%), which are carried out by men (Information: A = Fisherman, B = Employer, C = Housewife, D = Farmer, E = etc., F = Sagu Processor).

Figure 3). The development of fishermen has begun to progress from fishing to owning cages known as kelongs as fishing grounds. The nature of our society's work culture is focused on earning money quickly. If fishermen catch or net fish in the sea in the morning, they can sell it directly in the afternoon and make money from the sale of fish; therefore, most people become fishermen. As fishermen, the community switches to processing sago during the off-season when there is little to no fish catch. Sago processing starts with logging, and the processing sago until it becomes raw material for flour. This procces can be done by the community. The owner of the sago land will pay for services that work as daily laborers, calculated based on the agreement of both parties. Meanwhile, most women are housewives and help the family's economy as food sellers or handicraft artisans.



Information: A = Fisherman, B = Employer, C = Housewife, D = Farmer, E = etc., F = Sagu Processor.

Figure 3. Types of community work

### 3.5. Utilization of Plants

#### 3.5.1. Potential Diversity of Plant Species

After conducting observations and interviews in the East Lingga District, we were able to identify plant data for 366 species belonging to 103 families. The variety of known species shows that people interact very closely with plants in the surrounding environment used in people's lives. In addition, the location is isolated from the outside environment, forming a sense of independence in the need for survival. Communities that live close to forests tend to use plant resources as medicine, while food plants are produced from plantations or agricultural products. In Table 1, the Fabaceae family was the most used plant species with 22 species, the Myrtaceae family with 17 species, and the Zingiberaceae family with 12 species.

**Table 1.** The highest number of species and families found

No	Famili	Species	(%)
1	Fabaceae	22	6,01
2	Myrtaceae	17	4,64
3	Zingiberaceae	12	3,28
4	Moraceae	10	2,73
5	Rubiaceae	10	2,73
6	Anacardiaceae	9	2,46
7	Araceae	9	2,46
8	Arecaceae	9	2,46
9	Euphorbiaceae	9	2,46
10	Lauracea	9	2,46

The most species found and used are the Fabaceae family, a group of large leguminous plants. Examples of food plants that people consume are jengkol (*Archidendron pauciflorum*), bottle beans (*Psophocarpus tetragonolobus*), petai (*Parkia speciosa*), and yam (*Pachyrhizus erosus*), plants as animal feed are centro (*Centrosema pubescens*), and long bean leaves (*Vigna cylindrica*). Medicinal plants such as gorek fruit (*Caesalpinia crista*) and tamarind (*Tamarindus indica*).

#### 3.5.2. Plant Diversity Based on Habitus

The community's use of plants based on habitus was diverse, so they are grouped into trees, shrubs, herbs, herbs, shrubs, palms, lianas, and epiphytes. In Table 2, the habitus widely used is the tree habitus level of 46,99% for a total of 172 species. Based on interviews with the community, the habitus of trees that are widely used as building materials includes bengual trees (*Nauclea orientalis*), medicinal materials such as kani trees (*Quercus infectoria*), and firewood such as red kelat trees (*Syzygium sp.*). The second most habitus was shrubs, with a percentage of 20,22% of the 74 species found, including betadin plants (*Jatropha multifida*), purple eggplant (*Solanum melongena*), and gelenggang (*Cassia alata*).

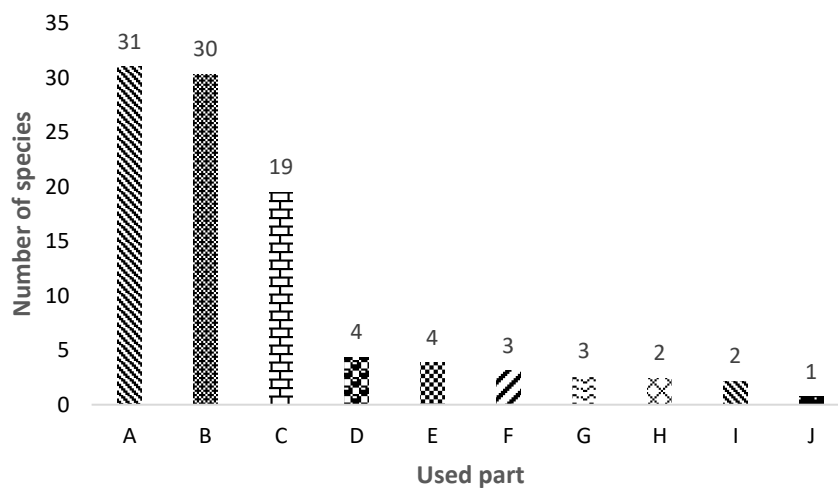
**Table 2.** Percentage of plant species use bag continues in East Lingga district

No	Habitus	Species	(%)
1	Tree	172	47
2	Shrub	94	26
3	Herbs	70	19
4	Vines	22	6
5	Palm	4	1
6	Fern	3	1
7	Bamboo	1	0,27

3.5.3. Plant Parts Used

The Malay community in East Lingga District uses plants in certain parts or several parts of plants. The leaves, stems, and fruit parts have almost the same ratio and are the most used by people daily. In Information: A = Leaf, B = Stem, C = Fruit, D = Root, E = Whole section, F = Seed, G = Rhizome, H = Bark, I = Flower, J = Sap

**Figure 4** the use of leaves as many as 92 species are used as food plants, medicinal plants, and other needs, such as water spinach (*Ipomoea aquatica*) and chicken paws (*Selaginella intermedia*). The use of stems is mainly for building materials and firewood. The community's housing conditions are still simple and depend on existing forest products. Community housing is a house in the form of stilts, or a stilt house. This is to avoid rising seawater, so it needs wooden support in its manufacture. Logs are cheap compared to concrete or cast building materials that need to be purchased outside the island, so the stem is the second most significant part of the plant in its utilization. According to Mohammad and Madanijah [9], fruit is a food source with vitamins and is very useful for growth, a fundamental substance for the body. The fruits used include kemang (*Mangifera kemanga*), cempedak (*Artocarpus integer*), coconut (*Cocos nucifera*), and durian (*Durio zibethinus*).



Information: A = Leaf, B = Stem, C = Fruit, D = Root, E = Whole section, F = Seed, G = Rhizome, H = Bark, I = Flower, J = Sap

**Figure 4.** Part of the plant used

3.5.4. Sources of Obtaining Plants

Based on the source of plant acquisition by the community comes from nature or wild plants and cultivated plants. The percentage of yields of 58% came from wild plants, while 90% were found in the forest of a total of 190 species growing wild and as much as 10% were wild plants that lived outside the woods with 21 species seen. Cultivated plants are an effort as a form of need often used by the community. By planting them intentionally, they can also be used at any time and become an effort to preserve plants [10]. Cultivation plants were grouped based on planting location, namely planted in the garden as many as 76 species with a percentage of 48%, and planted around the yard as many as 81 species with a ratio of 81%.

3.5.5. Food Plants

Based on the results of the interviews, 134 species of food plants with 98 families were identified. The utilization of food plant species obtained from wild plants or refined products is divided into staple food and other food. The critical thing to improve rural development can be seen in its traditional food sources. The advantages of food sources in each village vary according to the needs of the community. Most food consumption is still an effort to meet the needs of stamina and energy in activities. Food plants can be distinguished, including tubers, seeds or nuts, spices, vegetables, and fruits [11].

The most carbohydrate-producing food plant in East Lingga District is sago (*Metroxylon sago*). The vast sago forest has excellent potential as a source of carbohydrates for the community. The starch found in sago stalks is processed traditionally and then made into wet or dry flour. According to Bantacut [12], the carbohydrate content in sago starch is very high and has low glucose, so it is perfect for consumption by diabetics. In addition to other benefits, sago fills up faster than other sources of carbohydrates, is easy to digest, and prevents digestive problems. The level of sago consumption is relatively high, especially when people consume sago during significant events as a tradition, for example, processed sago, namely sago plates and laksa (Figure 5).



Figure 5. (a) Sago plate; (b) loose sago

Other carbohydrate-producing plant sources such as rice (*Oryza sativa*), sweet potatoes (*Ipomoea batatas*), cassava (*Manihot esculenta*), corn (*Zea mays*), and Gadung (*Dioscorea hispida*). Most of the consumption of fruit and seeds or nuts comes from local plant plantations, while other food sources come from exotic plants sent from other islands, such as imported fruit and food plants that are difficult to grow in the study area. The local plants include palm fruit (*Nypa fruticans*), mangosteen (*Garcinia mangostana*), purple eggplant (*Solanum melongena*), tomato (*Solanum lycopersicum*), and chayote (*Sechium edule*).

### 3.5.6. Medicinal Plants

The use of medicinal plants by the community is still believed in the traditional healing of diseases. The obstacle of long distances to health centers and hospitals makes medicinal plants an alternative to treatment. Based on the interview results, there are 156 species known as medicinal plants. The part of the most widely used plant is the leaf, which is processed by boiling and then drinking it. In concocting medicine, some plants are single in nature, and there are mixed plants in the form of concoctions from several medicinal plants. The mixed ingredients have properties for multiple disease problems (Table 3). The mild disease category usually uses a single plant that can be found in the yard, such as digestive problems using turmeric (*Curcuma domestica*) and guava (*Psidium guajava*). While diseases in the severe category are adjusted according to the type of disease, such as cancer, using soursop leaves (*Annona muricata*) and medicinal ingredients, one of which is used for diabetes, consists of areca nut (*Areca catechu*), henna leaves (*Lawsonia inermis*) and noni leaves (*Morinda citrifolia*), by boiling and drinking.

Table 3. Medicinal ingredients by the community

No	The type of disease	Potion
1	Birth medicine	Mempoyan, Kencur, Red Ginger, Turmeric, Temulawak, Temu Kunci, Henna leaves and fruit, Kani fruit, Bunut fruit
2	Medicine for shortness of breath, expel mucus	White pomegranate root, Senduduk putih root, Raya flower root

No	The type of disease	Potion
3	Fat disease	Sembung Jiwa leaves, White Turmeric, Black Turmeric, Temulawak, Mempoyan
4	Stomach ache	Guava root, shoot leaves, skin, and noni root
5	Stomach ache	Red onion, ginger
6	Hypertension, body aches, internal medicine, cholesterol, stamina	Garlic, Clove leaves, Pasak bumi root, Bunut fruit, Ginger, Temulawak

44 types of ingredients can be used in all diseases or activity enhancers. The respondents did not mention the types in them thoroughly because their memory began to fade. This herb has been sold in packaged form as simplicia, which has gone through the drying stage (Figure 6).



**Figure 6.** Packaged medicine

### 3.5.7. Animal Feed Plants

Plants used as animal feed, as many as 33 species identified. Livestock that is kept by the community tend to be released wild around the yard of the house or in the pasture from the cattle shed (Figure 7). This makes it easier for the livestock to find feed so the community does not take or clear grass. Known types of grass include bitter grass (*Paspalum conjugatum*), weeds (*Imperata cylindrica*), and sauheun (*Panicum palmifolium*). However, the impact of released livestock disrupts the plants cultivated by the community around the yard, such as eating cayenne pepper, spinach, kale, and celery (Figure 7). Sometimes people give leaves from cultivated plants in the garden, such as gadung leaves (*Dioscorea hispida*), gambas leaf (*Luffa acutangula*), long bean leaves (*Vigna cylindrica*), and others. According to Suarna and Suryani [13], forage plants can be developed for various uses and benefits such as germplasm sources, bare ground cover, preventing flooding, providing feed, land conservation, and climate change indicators. So there is a need for public awareness in the development and preservation of potential forage plants.

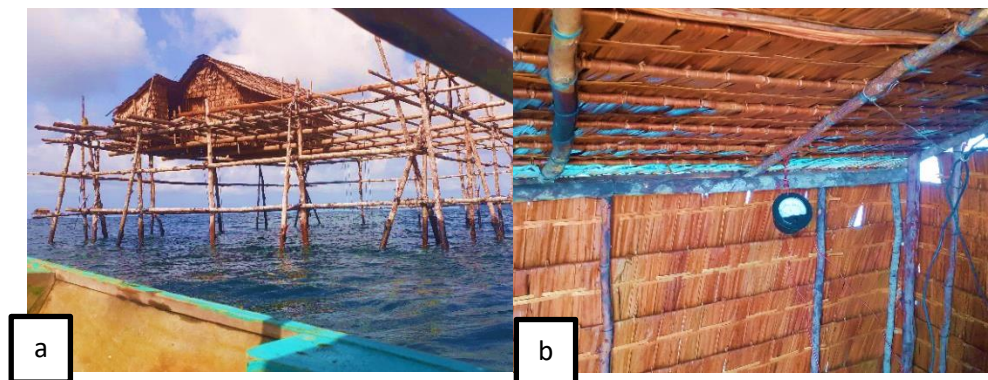


**Figure 7.** (a) Cultivaed plants in the yard; (b) livestock pens around the yard

### 3.5.8. Building Material Plants

Plants used as building materials based on interview results, there are 70 species with 35 known families. Generally, people use wooden building materials as boards or building supports, mostly used for making houses on stilts, boats or canoes, taverns, livestock pens, bridges, kelongs, and others (Figure 8). The woods used include tembesu (*Fagraea fragrans*), bintangur (*Calophyllum* sp), medang wood (*Neolitsea* sp), and pulai (*Alstonia scholaris*), and resak hill (*Cotylelobium malayanum*) as house wall boards or house floors. The roof is made of mengkuang leaves (*Pandanus artocarpus*), pandan rampe (*Pandanus sarasinorum*), and sago leaves (*Metroxylon sago*) (Figure 8).

The community uses tembesu wood because of its good quality for buildings. This is in accordance with the research of Islam et al. [14] Tembesu wood is a type of high-quality wood that is included in the strong class I-II category, durable class I, and class II resistant to fungus. Meanwhile, bintangur and medang wood are the most common types on the market and are reasonably good quality. According to Martawijaya et al. [15], bintangur wood is included in the durable class III-IV and strong class II-III category, while medang wood is included in the durable class III and strong class II category.



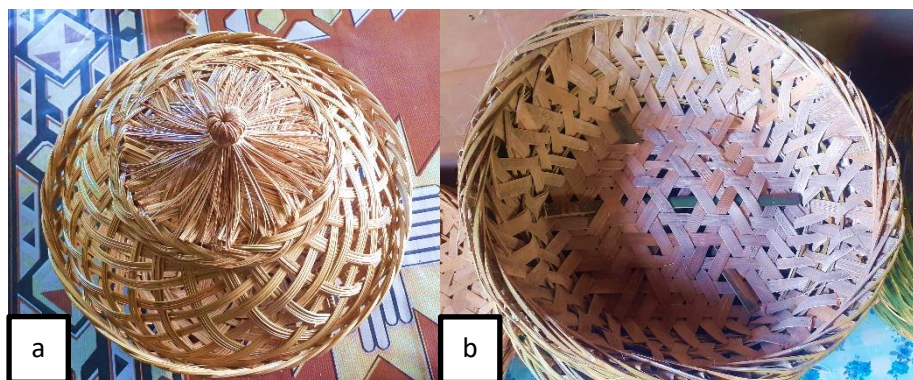
**Figure 8.** (a) Kelong/fisherman cages; (b) sago leaf roof (*Metroxylon sago*)

### 3.5.9. Plants that produce ropes, handicrafts, and webbing

The number of plant species used as a producer of rope and webbing is 17 species belong to 7 families. The woven products produced by the community include plates, fruit baskets, lid baskets, and cauldrons made from nipah sticks (*Nypa fruticans*) (Figure 9). As much as 80% of the weaving of leka done by women. However, a few years ago, the number of artisans began to decline in demand. This could happen due to a lack of knowledge and experience passed on to the younger generation, and it took quite a bit of time before the woven process could be used. However, the community's awareness of the previous heritage must be



developed. At the time of research, there were more and more artisan activities with the formation of groups of craftsmen.



**Figure 9.** (a) Wicker basket lid; (b) Kintau (Fish storage)

#### 3.5.10. Firewood Producing Plants

People's lives are simple, judging from energy sources, they still use a lot of firewood, the people call it firewood. Instead of using LPG fuel which is quite tricky to find, people use kerosene for their cooking needs. There are 82 species of plants used as firewood. Firewood is an option because it is obtained from the surrounding forest or yards, is cheap, is easy to find and only relies on energy to look for it. The firewood used includes mangroves (*Rhizophora* sp), nasi-nasi (*Syzygium Buxifolium*), terap (*Artocarpus* sp.), sago fronds and fig trees (*Ficus carica*).

East Lingga Sub-District is known for its quality charcoal-burning factories with the main ingredient being mangrove wood. There are 4 charcoal factories in East Lingga, located in Kerandin Village and Sei Pinang Village. Still, the legality of factories with complete permits is only in Kerandin Village. Mangrove charcoal produces good quality charcoal, creating a large calorific value of 3088 cal/g [16].

#### 3.5.11. Color Producing Plants

There are 16 species with 11 families in people's lives used as color producers. People utilize color-producing plants in food mixtures to impart a beautiful and unique impression to the food. Natural dyes are believed to be safe for health and produce softer, and non-contrasting colors [17]. For example, the green color used spinach (*Amaranthus hybridus*) and fragrant pandan (*Pandanus amaryllifolius*), orange from carrot (*Daucus carota*), turmeric (*Curcuma longa*) and temulawak (*Curcuma zanthorrhiza*), as well as purple from dragon fruit (*Selenicereus undatus*) and sweet potato jalar (*Ipomoea batatas*). In addition, people use plants for coloring, including gambier (*Uncaria gambir*) (Figure 10), agarwood (*Aquilaria malaccensis*), areca nut (*Areca catechu*), and ketapang (*Terminalia catappa*). In society, the use of color-producing plants is primarily reserved for food, while their use in textiles has long been abandoned due to successors not preserving the tradition.



**Figure 10.** Gambir (*Uncaria gambir*)

### 3.5.12. Ornamental Plants

Ornamental plants have an aesthetic appeal in the form of ornamental plants, leaves, trees, and flowers [18]. Ornamental plants that people plant around the house increase the attractiveness and freshness of the environment indoors and outdoors [19]. Based on the results of observations found 26 species with 16 identified families. The ornamental plants that the people have usually double with medicinal plants, such as broken bones (*Euphorbia tirucalli*), which are also used to treat external wounds and ylang is used for high blood pressure (*Cananga odorata*) (Figure 11).



**Figure 11.** Kenanga (*Cananga odorata*)

### 3.5.13. Plants for Customary Events and Worship

The community's knowledge of managing plants used for cultural purposes such as traditional, spiritual, rituals, or ancestral beliefs has been preserved from generation to generation based on their respective cultural characteristics. Based on the results of interviews with ethnic Malays in East Lingga District, they use plants based on stories from their parents, which are sometimes still believed to this day. One of these beliefs is to ward off evil spirits that disturb or enter people's homes, the multipurpose nipah plant is believed to be able to expel these evil spirits (Figure 12). The nipa leaves that have been shaved from the stick are then dried in the sun and made into palm fiber brooms, which is spiritually done by storing nipa brooms in front of the house near the entrance. In addition, there are plants used, namely cinnamon (*Cinnamomum burmanii*),



**Figure 12.** Nipah (*Nypa fruticans*)

## 4. Conclusions

The Malay ethnic community of East Lingga District uses 366 plant species with 103 identified families. The most families found were the Fabaceae family, including medicinal plants, food, building materials, rope/crafts, fuel, animal feed, and others. Most of the sources of income come from the wild (58%), with the most widely used tree habitus being 176 species. The

most used plant parts are leaves (92 species), stems, and fruit. The island's location surrounded by the ocean forms a sense of community independence in fulfilling needs using the surrounding natural resources. The utilization by the community is still traditional in its use. This is maintained from knowledge and experience passed down from generation to generation.

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