BIODIVERSITAS
Volume 26, Number 3, March 2025
Pages: 1105-1113

ISSN: 1412-033X
E-ISSN: 2085-4722
DOI: 10.13057/biodiv/d260309

Diversity and utilization of plants in *kelekak* agroforestry in Air Mesu Village, Central Bangka District, Indonesia

AGUS HIKMAT[1,♥], ERVIZAL A. M. ZUHUD[1], PRIMADHIKA AL MANAR[1,♥♥], RADIL WILYAN[1], IKRAM KURNIA MUNGGARAN[1], SYAMSUL HIDAYAT[2], ROBIKA[3]

[1]Department of Forest Resources Conservation and Ecotourism, Faculty of Forestry and Environment, Institut Pertanian Bogor. Jl. Lingkar Akademik Kampus Institut Pertanian Bogor Dramaga, Bogor 16680, West Java, Indonesia. Tel./fax.: +62-251-621677, ♥email: ahikmat@apps.ipb.ac.id; ♥♥email: primadhikamanar@apps.ipb.ac.id

[2]National Research and Innovative Agency. Jl. M.H. Thamrin No. 8, Central Jakarta 10340, Jakarta, Indonesia

[3]Universitas Bangka Belitung. Kampus Terpadu Balun Ijuk, Merawang, Bangka 33172, Bangka Belitung, Indonesia

Manuscript received: 13 September 2024. Revision accepted: 4 February 2025.

Abstract. *Hikmat A, Zuhud EAM, Al-Manar P, Wilyan R, Munggaran IK, Hidayat S, Robika. 2025. Diversity and utilization of plants in* kelekak *agroforestry in Air Mesu Village, Central Bangka District, Indonesia. Biodiversitas 26: 1105-1113. Kelekak* is a traditional agroforestry system practiced in Bangka Belitung Islands, Indonesia which holds important ecological, economic and socio-cultural roles. Despite its importance, the existence of *kelekak* in these islands is increasingly pressured by land use changes due to the conversion to oil palm plantation and tin mines. This research aims to identify plant species found in *kelekak* agroforestry in Air Mesu Village, Central Bangka District and their utilization based on ethnobotanical information. The research was conducted using the interview method to 30 selected respondents. This study documented 87 plant species from 45 families found in *kelekak* with various types of use including for food, medicine, building materials, and firewood. The majority of plants are utilized to produce food, highlighting the importance of *kelekak* in sustaining local food security. Five plant species are identified to have a high Index of Cultural Significance (ICS), namely durian (*Durio zibethinus*), mangosteen (*Garcinia mangostana*), coconut (*Cocos nucifera*), rubber (*Hevea brasiliensis*) and cempedak (*Artocarpus integer*). The existence of *kelekak* is very important in supporting various needs of local community in Air Mesu Village.

Keywords: Agroforestry, ethnobotany, Index of Cultural Significance, *kelekak*

INTRODUCTION

Ethnobotany is a science related to the relationship between humans, society and its environment in the use of plants, including their preservation (Hamzah et al. 2023). Ethnobotany is composed of two Greek words, namely ethnos which means nation and botany which means plants. Ethnobotany plays a very important in sustainable utilization of plant species by local communities while maintaining nature conservation. Ethnobotanical studies provide useful information regarding the status of natural resources in a location, data on the distribution of valuable plant species, and information about traditional ecological knowledge in land use management including agriculture. Pei et al. (2020) stated that ethnobotany is very relevant to resolve various global concerns currently happening including problems related to food security, climate change, biodiversity conservation and human health.

Many community groups in Indonesia utilize plant species based on their ethnobotanical knowledge, mainly using simple practices and tools. This knowledge and practice are inherited from their ancestors who have been long observing and understanding the surrounding environment including the utilization of plants. One of traditional communities in Indonesia which has been practicing ethnobotanical knowledge is the people of Air Mesu Village, Central Bangka District, Bangka Belitung Islands, Indonesia. The community in this village manages local agroforestry system called *kelekak*. According to Haryadi and Sari (2022), *kelekak* is broadly used term for a typical garden managed by the people of the Bangka Belitung Islands. *Kelekak* is generally composed of various local plant species, mainly fruit trees, which are planted with motivation to benefit future generations, highlighting a unique local wisdom that maintains environmental as well as cultural sustainability (Chikmawati et al. 2023).

Agroforestry is a farming system that combines agricultural and forestry plants being planted simultaneously in a particular spatial or temporal arrangement (Abbas et al. 2017; Keerthika et al. 2024; Kinyili et al. 2024). Due to its complex structure with high species diversity and composition, agroforestry forms multi-canopy layers with a mixture of trees, shrubs, and annual plants on one piece of land (Olivi et al. 2015). Santiago-Freijanes et al. (2021) argued that agroforestry is a sustainable land management practice that integrates woody plants with lower-level agriculture. Agroforestry provides ecological functions that are more similar to forests than agriculture (Pantera et al. 2021). Agroforestry practices have been shown to reduce or reverse land degradation, sequester carbon (C) from the atmosphere, and secure rural livelihoods through the provision of economic benefits, especially in rural areas (Catacutan et al. 2017; Kuyah et al. 2017; Montagnini and Metzel 2017;

Waldron et al. 2017; Saqib et al. 2019). Several regions in Indonesia implement agroforestry systems with different names and characteristics, for example *talun*, which is usually managed by communities in the West Java area.

Despite its importance in preserving biological and cultural diversity, *kelekak* is increasingly pressured by land use changes, mainly being converted into oil palm plantations and tin mines. There have been several studies investigated *kelekak*, covering various aspects such as the traditional wisdom of the community regarding *kelekak* (Henri et al. 2022), challenges to *kelekak* due to tin mining (Darwance et al. 2022), and the history and biodiversity of *kelekak* (Al Manar et al. 2025). Nevertheless, further research is still needed to maintain the area and existence of *kelekak* and to raise public awareness to maintain traditional gardens in the Bangka Belitung Islands. This research aimed to document the ethnobotanical knowledge of plant utilization in *kelekak* agroforestry by the local community in Air Mesu Village, Central Bangka District. The results of this study are expected to contribute to the preservation of traditional knowledge, support local biodiversity conservation efforts, and serve as a basis for sustainable natural resource management. In addition, the results of this study can also be used as a reference in policymaking related to agroforestry and environmental management, as well as educational materials for the community and academics regarding the importance of *kelekak* in maintaining ecosystem balance and the welfare of local communities.

MATERIALS AND METHODS

Study period and area

The research was conducted in January-February 2024 located in Air Mesu Village, Pangkalan Baru Sub-district, Central Bangka District, Bangka Belitung Islands Province, Indonesia (Figure 1). Air Mesu Village has an extent of 30.81 km^2 and an altitude of 20 meters above sea level. To the north, Air Mesu Village is directly bordered by Jeruk Village, to the south by Cambai Village, to the east by East Air Mesu Village, and to the west by Beruas and Terak Villages. The average daily temperature of Air Mesu Village is around 31-32˚C and air humidity reaches 43%. The average rainfall in Air Mesu Village is 41 mm/day. Most of the village is relatively flat with slope around 5˚and there is hill known as Mangkol Hill with elevation around 395 meters above sea level. The population of Air Mesu Village is 3,566, consisting of 1,839 men and 1,727 women. Most of the people of the village work as farmers in *kelekak*.

Procedures

The research was conducted using interviews method to with respondents selected using simple random sampling. In-depth interviews were conducted using open questionnaires where respondents were asked to answer questions according to their knowledge. Respondents selected those who managed *kelekak* and/or were directly and indirectly involved in utilizing plant species resources in *kelekak*. Information collected through interviews included respondent characteristics, plant species utilized, forms of utilization, and the intensity of utilization of plant species by the community.

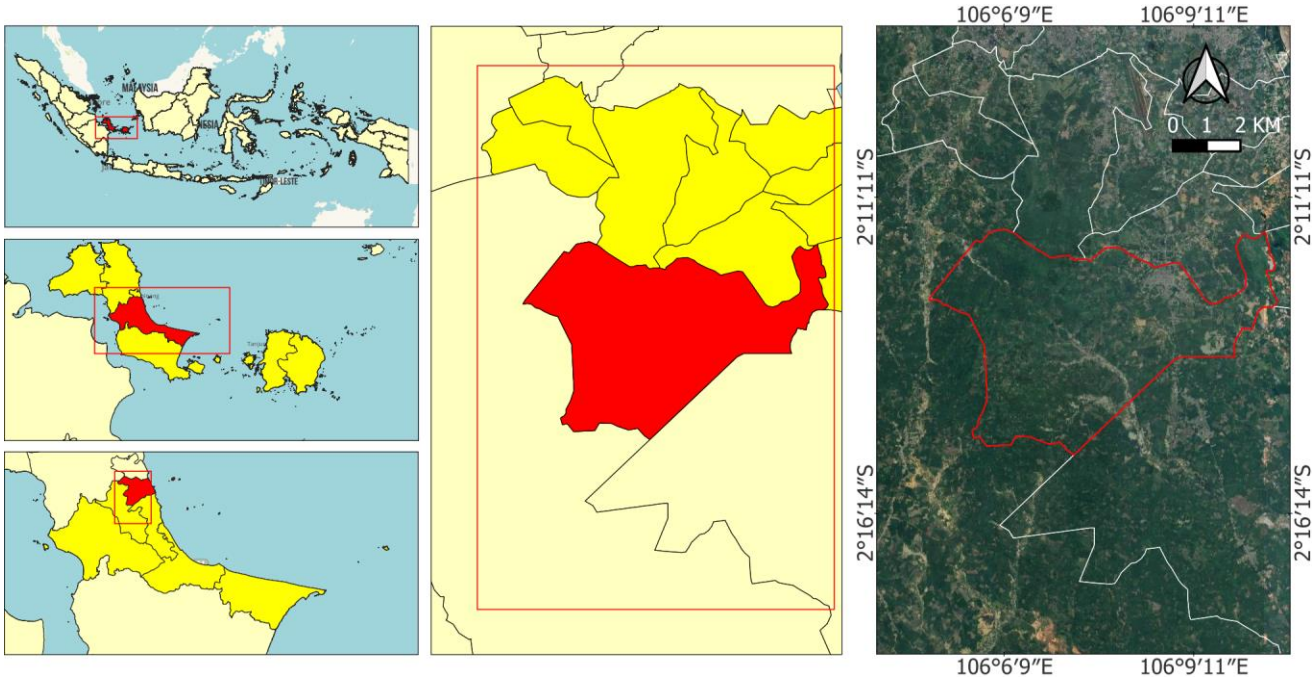

Figure 1. Map of research location in Air Mesu Village, Pangkalan Baru Sub-district, Central Bangka District, Bangka Belitung Islands Province, Indonesia

Data analysis

Data from the interviews were analyzed and presented quantitatively and descriptively. The importance of a plant species was assessed using formula by Turner (1988) to calculate the Index of Cultural Significance (ICS) using three aspects as described below.

Quality value

Quality value describes the use of plant species in daily life assessed using the following criteria: Score 5: main food ingredient; Score 4: secondary food; Score 3: other foods and secondary medicinal substances; Score 2: ritual, mythical and recreational material; Score 1: known plant but not specifically used.

Intensity value

Intensity value indicates the frequency of plant species using in daily life assessed using the following criteria: Score 5: very high intensity; species with use frequency of daily or seasonal basis; major effect on daily or yearly living; population is often intentionally maintained through cultivation or habitat modification; gathering and/or preparation and/or trading of plant product as a primary cultural activity; Score 4: moderately high use intensity; species acknowledged frequently, often affecting daily and/or seasonal living; gathering and/or preparation and/or trading and/or attention with a significant cultural activity; Score 3: medium intensity of use; species acknowledged regularly, occasionally affecting daily and/or seasonal living; gathering and/or preparation and/or trading and/or attention with a relatively important cultural activity; Score 2: low use intensity; species acknowledged casually; low impact on daily or seasonal living; gathering and/or preparation and/or other attention with a minor cultural activity; Score 1: minimal use intensity; used or acknowledged only rarely; negligible impact on daily or seasonal living.

Exclusivity value

Exclusivity value indicates the level of plant species that are preferred or less preferred based on choices with the following values: Score 2: the most preferred plant species and is the main choice and cannot be replaced; Score 1: there are several species that are likely to be selected; Score 0.5: secondary source with low exclusivity.

The Index of Cultural Significance (ICS) was calculated using the equation:

$$ICS = \sum_{i=1}^{n} (q \times i \times e)_{ni}$$

Where:

ICS : Index of Cultural Significance
q_i : Quality value
i_i : Intensity value
e_i : Exclusivity value

RESULTS AND DISCUSSION

Respondents' characteristics

The 30 respondents in Air Mesu Village were composed of 83% male respondents and 17% female respondents. Respondents in the early elderly (46-55 years) were dominant with 43% while late teens (17-25 years) were the lowest with 1%. All respondents are ethnic Malay. According to Henri et al. (2020), ancestors passed down ethnobotanical knowledge from generation to generation so that older respondents generally understand more about the use of plant species. The level of education of the respondents was dominated by elementary school with 47% where most of them were over 46 years old. This was caused by the difficulty of access to schools at that time and the inadequate facilities and infrastructure. Farmers dominated respondents' occupation since Air Mesu has excellent agricultural potential, so many people depend on agriculture for their livelihoods.

Diversity of utilized plants in *kelekak*

Based on the interview, community in Air Mesu village utilized 87 plant species from 45 families found in *kelekak* for various uses including for food, medicine, building materials, firewood, and other uses (Table 1). Myrtaceae was the most dominant family with 8 species, followed by Anacardiaceae and Fabaceae each with 7 species then Rutaceae and Areaceceae each with 6 species.

Plant species from the Myrtaceae family included wild guava (*Syzygium* sp.), salam (*S. polyanthum*), *jambu hutan* (*S. jambos*), malay apple (*S. malaccense*), cloves (*S. aromaticum*), water apple (*S. aqueum*), guava (*Psidium guajava*), and crystal guava (*P. guajava* var *kristal*). Myrtaceae is a large group with 5,800 plant species and consists of fruit trees spread across tropical and subtropical regions (Stefanello et al. 2011). Plants from the Myrtaceae family are usually used as food crops in the form of fruit. According to the community, fruit is chosen for consumption because it has many benefits for body health and can be consumed directly without processing.

Habitus

Beside diverse in taxa, plants found in *kelekak* are also diverse in term of habitus (physical form or growth form) including trees, herbs, shrubs, and palms. Trees dominated plant habitus in *kelekak* with 67 species, followed by herb with 14 species and shrub with 13 species (Figure 2). Trees usually have a diameter of more than 20 cm with a height of more than 5 m. The dominant habitus in *kelekak* was tree because it is mainly composed by fruit plants that have a tree form. According to Cavender-Bares et al. (2022), trees have many benefits, such as being a source of important products, including wood, food for humans, resins, and as carbon dioxide absorbers. Plants with habitus of herbaceous form include *Musa* sp., *Alpinia galanga*, *Kaempferia galanga*, and *Zingiber officinale*. *Kelekak* is dominated by fruit plants, which are the characteristics of the agroforestry system in Bangka Belitung. This is different from other agroforestry in Indonesia, such as *repong* in Lampung which is dominated by *Shorea javanica* (Susanti et al. 2018; Laura and Darmawan 2020; Santoso et al. 2023).

Table 1. Plant species found in *kelekak* utilized by the community in Air Mesu Village, Bangka Belitung Islands, Indonesia

Local name	Scientific name	Family	Habitus	Use
Melangir	*Albizia saponaria*	Fabaceae	Tree	BM
Kemiri	*Aleurites moluccana*	Euphorbiaceae	Tree	SP, FW
Lidah buaya	*Aloe barbadensis*	Asphodelaceae	Herb	MP
Lengkuas	*Alpinia galanga*	Zingiberaceae	Herb	SP, MP
Pulai	*Alstonia scholaris*	Apocynaceae	Tree	BM
Jambu monyet	*Anacardium occidentale*	Anacardiaceae	Tree	FP
Nanas	*Ananas comosus*	Bromeliaceae	Herb	FP
Srikaya	*Annona squamosa*	Annonaceae	Tree	FP
Pelangas	*Aporosa aurita*	Euphorbiaceae	Tree	FW, BM
Jengkol	*Archidendron pauciflorum*	Fabaceae	Tree	FP, BM
Pinang	*Areca catechu*	Arecaceae	Palm	MP
Aren	*Arenga pinnata*	Arecaceae	Palm	MP, FP
Nangka	*Artocarpus heterophyllus*	Moraceae	Tree	FP, BM, FW
Cempedak	*Artocarpus integer*	Moraceae	Tree	FP, BM. FW
Belimbing wuluh	*Averrhoa bilimbi*	Oxalidaceae	Shrubs	SP
Belimbing	*Averrhoa carambola*	Oxalidaceae	Tree	FP
Rambai	*Baccaurea motleyana*	Phyllanthaceae	Tree	FP, MP
Belilik	*Brucea javanica*	Simaroubaceae	Herb	FP
Cabai keriting	*Capsicum annum*	Solanaceae	Shrubs	SP
Cabai rawit	*Capsicum frutescens*	Solanaceae	Shrubs	SP
Pepaya	*Carica papaya*	Caricaceae	Tree	FP
Jeruk nipis	*Citrus aurantifolia*	Rutaceae	Tree	FP, MP
Jeruk limau	*Citrus hystrix*	Rutaceae	Shrubs	FP
Jeruk jepun	*Citrus ichangensis*	Rutaceae	Tree	FP, Ornamental Plant
Jeruk lemon	*Citrus limon*	Rutaceae	Tree	FP
Jeruk bali	*Citrus maxima*	Rutaceae	Tree	FP
Kelapa	*Cocos nucifera*	Arecaceae	Palm	FP, MP, BM, FW, rice cake wraps (*ketupat*), woven material, broomstick material
Talas	*Colocasia esculenta*	Araceae	Herb	FP
Pucuk idat	*Cratoxylum glaucum*	Hyperiaceae	Tree	FP
Timun	*Cucumis sativus*	Cucurbitaceae	Herb	FP
Kunyit	*Curcuma longa*	Zingiberaceae	Herb	SP, MP
Serai	*Cymbopogon citratus*	Poaceae	Herb	SP
Kelengkeng	*Dimocarpus longan*	Sapindaceae	Tree	FP
Ubi	*Dioscorea alata*	Convolvulaceae	Shrubs	FP
Daun suji	*Dracaena angustifolia* var. *honoriae*	Asparagaceae	Shrubs	FP
Durian	*Durio zibethinus*	Malvaceae	Tree	BM, FW, FP
Jelutung	*Dyera constulata*	Apocynaceae	Tree	FW, BM
Sawit	*Elaeis guineensis*	Arecaceae	Palm	-
Pasak bumi	*Eurycoma longifolia*	Simaroubaceae	Tree	MP
Manggis	*Garcinia mangostana*	Clusiaceae	Tree	FP, FW, MP, Sap preservative
Melinjo	*Gnetum gnemon*	Gnetaceae	Tree	FP
Sambung nyawa	*Gynura procumbens*	Asteraceae	Shrubs	MP
Karet	*Hevea brasiliensis*	Euphorbiaceae	Tree	FW
Kembang sepatu	*Hibiscus rosasinensis*	Malvaceae	Shrubs	MP
Mensirak	*Ilex cymosa*	Lauraceae	Tree	FW, BM
Kencur	*Kaempferia galanga*	Zingiberaceae	Herb	SP
Langsat	*Lansium Domesticum*	Meliaceae	Tree	FP
Duku	*Lansium parasiticum*	Meliaceae	Tree	FP
Mengkikir	*Lithocarpus sundaicus*	Fagaceae	Tree	FW, BM
Apel	*Malus domestica*	Rosaceae	Tree	FP
Binjai	*Mangifera caesia*	Anarcadiaceae	Tree	FP, MP, SP, BM
Bacang	*Mangifera foetida*	Anarcadiaceae	Tree	FP
Mangga	*Mangifera indica*	Anarcadiaceae	Tree	FP, BM
Kweni	*Mangifera odorata*	Anarcadiaceae	Tree	FP, BM
Singkong	*Manihot esculenta*	Euphorbiaceae	Shrubs	FP
Sawo	*Manilkara zapota*	Sapotaceae	Tree	FP
Sagu	*Metroxylon sagu*	Arecaceae	Palm	BM
Murbei	*Morus alba*	Moraceae	Shrubs	FP
Pisang	*Musa* sp.	Musaceae	Herb	FP
Rambutan	*Nephelium lappaceum*	Sapindaceae	Tree	FP, FW
Nyatoh	*Palaquium obtusifolium*	Sapotaceae	Tree	BM
Pandan	*Pandanus ammaryllifolius*	Pandanaceae	Herb	SP

Petai	*Parkia speciosa*	Fabaceae	Tree	FP, FW
Alpukat	*Persea americana*	Lauraceae	Tree	FP, MP
Ceremai	*Phyllanthus acidus*	Phyllanthaceae	Tree	FP
Lada	*Piper nigrum*	Piperaceae	Herb	SP
Matoa	*Pometia pinnata*	Sapindaceae	Tree	FP
Sawo Australia	*Pouteria caimito*	Sapotaceae	Tree	FP
Alkesa	*Pouteria campechiana*	Sapotaceae	Tree	FP
Jambu biji	*Psidium guajava*	Myrtaceae	Tree	FP, MP
Jambu kristal	*Psidium guajava*	Myrtaceae	Tree	FP
Salak	*Salacca zalacca*	Arecaceae	Palm	FP
Ketapi	*Sandoricum koetjape*	Meliaceae	Tree	FP, BM, FW
Puspa	*Schima wallichii*	Theaceae	Tree	BM, FW
Tomat	*Solanum lycopersicum*	Solanaceae	Shrubs	SP
Terong	*Solanum melongena*	Solanaceae	Shrubs	SP
Kedondong	*Spondia dulcis*	Anarcadiaceae	Tree	FP, SP
Mahoni	*Swietenia macrophylla*	Meliaceae	Tree	BM
Jambu air	*Syzygium aqueum*	Myrtaceae	Tree	FP
Cengkeh	*Syzygium aromaticum*	Myrtaceae	Tree	FW
Jambu bol	*Syzygium malaccense*	Myrtaceae	Tree	FP
Salam	*Syzygium polyanthum*	Myrtaceae	Tree	SP
Jambu kuno	*Syzygium* sp.	Myrtaceae	Tree	FP
Asam jawa	*Tamarindus indica*	Fabaceae	Tree	SP
Coklat	*Theobroma cacao*	Stercualiaceae	Tree	FP
Brotowali	*Tinospora cordifolia*	Menispermaceae	Shrubs	MP
Leben	*Vitex pinnata*	Lamiaceae	Tree	FW, BM
Jahe	*Zingiber officinale*	Zingiberaceae	Herb	SP, MP

Note: BM: Building Materials; FP: Food Plant; FW: Fire Wood; MP: Medicinal Pant; SP: Spice Plant

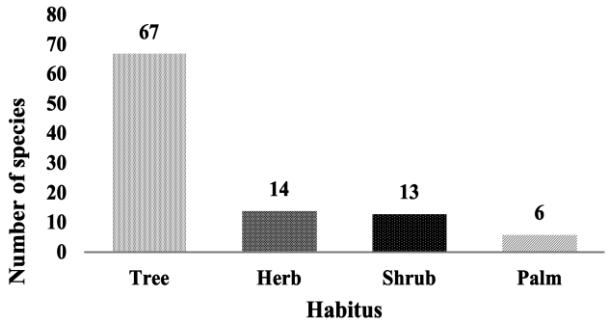

Figure 2. The habitus of plant found in *kelekak* in Air Mesu Village, Bangka Belitung Islands, Indonesia

Plant uses

Plant uses are grouped into food plants, medicinal plants, plants that produce building materials, plants that produce firewood, and other plants (Table 2). Plant species are most widely used by the community as food plants, generally used directly or processed into cooking spices. One species that is often used by the community is coconut (*Cocos nucifera*). Coconuts can be used as food, medicine, building materials, and even firewood. This finding is in line with Yeboah et al. (2020) which stated the many benefits of coconut for humans.

Utilization of plants as food

While there are around 30,000 plant species considered edible, only a small number have been cultivated for food on a commercially significant scale (Chrysargyris et al. 2023). There are 70 plant species from 42 families utilized as food in *kelekak* in Air Mesu Village for fruit, spices, vegetables, drinks, and sources of carbohydrates (Table 3).

Based on Table 3, the food plant species most frequently used by the community are fruits with 42 species including durian (*Durio zibethinus*), jackfruit (*Artocarpus heterophyllus*), *cempedak* (*A. integer*), *rambutan* (*Nephelium lappaceum*), and mangosteen (*Garcinia mangostana*). Beside directly consumed, the people also sell the fruits to increase their income. One species that is often consumed and sold is durian (*D. zibethinus*). Durian is very popular because of its delicious taste and high selling value. According to Chua et al. (2023), durian flesh contains protein, lipids, carbohydrates, and fiber nutrients. This makes durian still famous for cultivation by the people of Air Mesu Village. Several cultivars of durian are cultivated, including local durian, *cumasi* durian, *musang king* durian, and *super tembaga* durian. There is a durian festival in Air Mesu Village routinely held once a year during the harvest season.

Utilization of plants for medicine

According to Puspitasari et al. (2018), medicinal plants have beneficial compounds in preventing disease. The number of medicinal plants found during data collection was 19 species from 13 families (Table 4).

Table 2. The uses of plants found in *kelekak* in Air Mesu Village, Bangka Belitung Islands, Indonesia

Utilization category	Number of species	Number of family
Food plant	70	34
Medicinal plant	17	13
Building material	18	13
Firewood	16	13
Others	3	3

Table 3. Plant species found in *kelekak* used as food in Air Mesu Village, Bangka Belitung Islands, Indonesia

Type of utilization	Number of species	Percentage (%)
Fruits	42	60.00
Spice	13	18.58
Vegetables	9	12.86
Drink	3	4.28
Source of carbohydrates	3	4.28

Table 4. Plant species found in *kelekak* used for medicinal purposes in Air Mesu Village, Bangka Belitung Islands, Indonesia

Local name	Scientific name	Ailment
Alpukat	*Persea americana*	Gout
Aren	*Arenga pinnata*	Stamina enhancer
Binjai	*Mangifera caesia*	Cholesterol
Brotowali	*Tinospora cordifolia*	Fever
Jahe	*Zingiber officinale*	Cold
Jambu biji	*Psidium guajava*	Dengue fever, stomach ache, and skin smoothing
Jeruk nipis	*Citrus aurantifolia*	Cough
Kelapa	*Cocos nucifera*	Fever/bruising
Kembang sepatu	*Hibiscus rosasinensis*	Fever
Kunyit	*Curcuma longa*	Indigestion
Lengkuas	*Alpinia galanga*	Tinea versicolor
Lidah buaya	*Aloe barbadensis*	Hair strengthener
Manggis	*Garcinia mangostana*	Cholesterol
Pasak bumi	*Eurycoma longifolia*	Stamina enhancer
Pinang	*Areca catechu*	Teeth strengthener
Rambai	*Baccaurea motleyana*	Constipation
Sambung nyawa	*Gynura procumbens*	Hypertension

The medicinal plant species often used by the community is sugar palm (*Arenga pinnata*). According to one respondent, sugar palm can be used as a medicine to increase stamina. Sugar palm has the potential to be used as a stamina-enhancer because it is known to be rich in sugars and electrolytes. It is consumed as a natural energy drink by people in some regions to combat fatigue and boost stamina, particularly among laborers (Akhtar et al. 2024). Apart from sugar palm, medicinal plant species from the Arecaceae family used by the community are coconut (*C. nucifera*) and areca nut (*Areca catechu*). Coconut is one of the most useful trees in the world since it produces several items such as coconut oil, coconut milk, coconut meat, and coconut water or juice (Patil and Benjakul 2018). Coconut is a medicine for bruises, and areca nut is a medicine for strengthening teeth. Coconut can be used as a medicine for bruises after being processed into coconut oil. When coconut oil is applied to an infected part of the body, it will protect that part of the body from dust, air, fungi, and viruses. Coconut water has potential therapeutic effects and can prevent and relieve numerous health problems, including dehydration, constipation, digestive disorders, weariness, heatstroke, diarrhoea, kidney stones, and urinary tract infections (Patil and Benjakul 2018; Badilla et al. 2020; Coulibaly et al. 2023). Ginger (*Z. officinale*) and guava (*P. guajava*) are plant species that are also often used as medicine in Air Mesu Village. Ginger is known to have many benefits for curing various diseases. According to Tan and Vinitha (2004), ginger has a direct anti-microbial activity, which can treat bacterial infections. Ginger is also useful for warming the body and benefits the lungs, spleen, and stomach meridians (Zhang et al. 2024). Ginger's bioactive components include terpenoids, phenolics, gingerols, shogaols, zingiberene, and zingerone; however, the concentrations of each particular component are modified by the kind and variety of ginger as well as its preparation (Anh et al. 2020).

Utilization of plants as building materials

The people of Air Mesu Village also use plants in *kelekak* as building materials. Several species found in *kelekak* are wood-producing plants. This is because *kelekak* is an agroforestry system with the presence of various timber that produce wood and wood products. The community in the village uses 18 plant species as building materials (Table 1). Anacardiaceae family has three species that are used as building materials, namely, mango (*Mangifera indica*), *binjai* (*M. caesia*), and *kweni* (*M. odorata*). Mango tree wood is usually used to make houses and other buildings because it is durable and robust (Sharma and Mohanty 2021). According to the community, wood from fruit trees will be used when they are old and produce less fruit. The wood is usually used to make huts in *kelekak* which functions to serve as a place to rest in *kelekak*, a place to store harvests temporarily, and a gathering place when the family visits *kelekak*. Based on observations, not all *kelekak* have huts. Plant species that are often used to make huts include *cempedak* (*A. integer*), durian (*D. zibethinus*), and jackfruit (*A. heterophyllus*). According to the community, these plant species produce strong wood used as building material. *Artocarpus* species such as *cempedak* can produce dense wood for construction, furniture, and other uses, thus potentially serving as an alternative tree species for timber production in agroforestry in Asian countries (Takeuchi et al. 2019).

Utilization of plants for firewood

People also use plants in *kelekak* for firewood as an alternative fuel source. Firewood is considered more economical and more accessible to obtain in Air Mesu Village. Firewood is usually used when people process food with a relatively long cooking time. Based on Table 1, as many as 16 plant species are used for firewood. Almost all plant species used as firewood are tree-based plants. The parts used as firewood are usually twigs and branches of trees that are getting old and have fallen to the ground. People will collect twigs and branches to use as firewood when needed. One of the community's uses of firewood is fuel for making palm sugar using *cempedak* wood in order to reduce cost.

Plant part used

The parts of plant species that the people in Air Mesu Village use are fruit, stems, leaves, rhizomes, tubers, water, fruit skins, husks, twigs, sap, seeds, fronds, and all parts (Figure 3). The most often used plant part is fruit with 58 species. Fruits are often used because they are easy to find

and do not need to be processed for consumption. Fruit is usually eaten directly or processed into other products, such as traditional cakes. Other plant part often used is the stem with 27 uses species, mainly are used for building materials and firewood. Beside fruit and stems, leaves are also widely used with 15 species, usually used in traditional medicines, such as guava leaves (*P. guajava*), to treat stomach aches. Leaves are widely used because they are easy and abundant to find and have adequate nutritional content. According to Nordeide et al. (1996), green leaves were rich in energy, protein and minerals (calcium, iron).

Processing methods

Processing methods are activities that change raw materials mechanically, chemically, or by hand to produce semi-finished goods or goods of higher value. Processing methods are categorized into unprocessed, boiled, pounded, squeezed, and grated (Figure 4). The highest method of processing plant species is not processing them. People tend not to cultivate plant species because they are more accessible and use it straightforward. Usually, the part of the plant that is not processed is the fruit. Other processing method that is often used is boiling including mangosteen peel (*G. mangostana*), which is boiled to treat cholesterol problem. According to Megawati et al. (2024), people believe that boiling can kill bacteria found in plants, can release more compounds, and is considered safer.

Utilization method

Utilization by eating has a high frequency with 43 species, such snake fruit (*Salacca zalacca*), *kedondong* (*Spondia dulcis*), and *rambai* (*Baccaurea motleyana*) (Figure 5). Generally, the people eat it directly because its simplicity. Other method of use is by burning because people still use firewood as a fuel. Some examples of species that are burned are wood from the *petai* tree (*Parkia speciosa*), candlenut (*Aleurites moluccana*), and *pelangas* (*Aporosa aurita*). Drinking and mixing also has a high frequency, for example *kedondong* leaves (*S. dulcis*) which are used as a cooking spice.

Intensity of use

Intensity of use is the level of use of a plant assessed by whether it is frequently or rarely used by the respondents. The majority of species (74) is rarely used since the plants found in *kelekak* are generally fruit plants that bear fruit in certain seasons (Figure 6). As many 42 species have high frequency of use since they produce products all year round, such as sugar palm (*A. pinnata*), lime (*Citrus aurantifolia*), lemongrass (*Cymbopogon citratus*), and others. Sugar palm is a commodity that has potential because all parts of sugar palm can be used in the manufacturing industry (Zuhud et al. 2020). One thing that can be used from sugar palm is palm juice, which can be processed into palm sugar. According to Zuhud et al. (2020) tapping palm juice can be done when the palm is 8-10 years old and has female flowers. The use of sugar palm is relatively frequent because palm tapping is done twice a day, namely every 8 am and 4 pm.

Index of Cultural Significance (ICS)

One of the important quantitative assessments in ethnobotany is evaluating the cultural significance of certain species in a community through an Index of Cultural Significance (Helida et al. 2015). The Index of Cultural Significance (ICS) shows the importance of each useful plant based on community needs. ICS is an essential basic information for considering important species and can improve the community's economy.

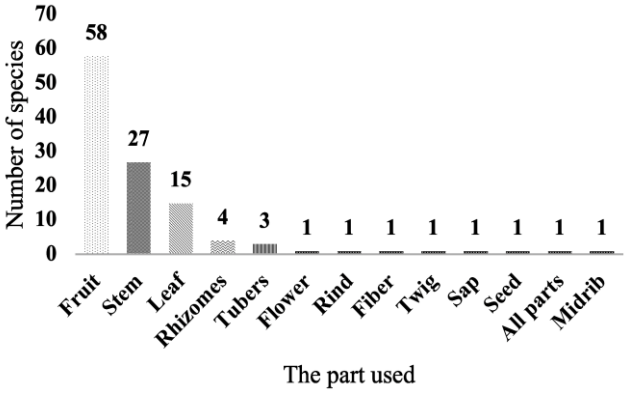

Figure 3. Part of plants used by community in Air Mesu Village, Bangka Belitung Islands, Indonesia

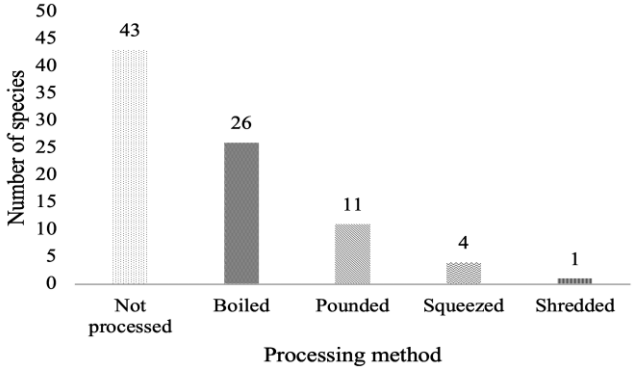

Figure 4. Processing method of plants used by community in Air Mesu Village, Bangka Belitung Islands, Indonesia

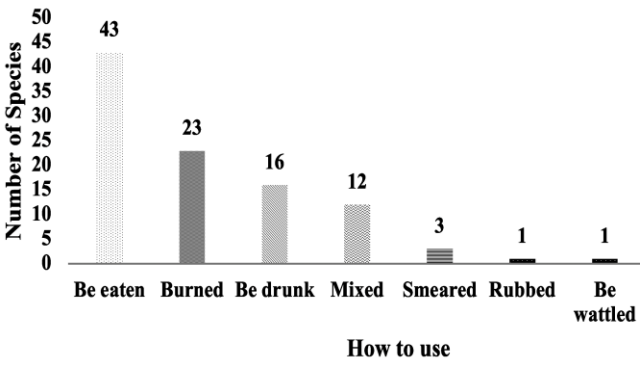

Figure 5. Utilization method of plants used by community in Air Mesu Village, Bangka Belitung Islands, Indonesia

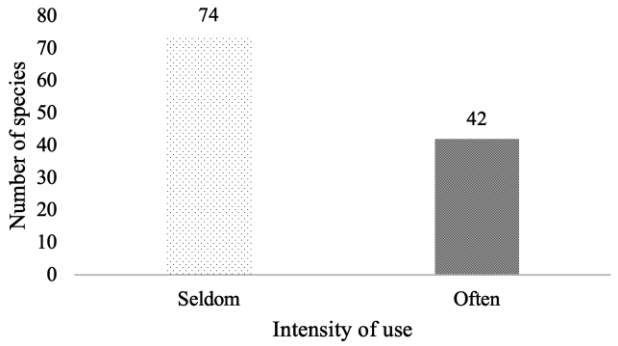

Figure 6. Intensity of use of plants found in *kelekak* in Air Mesu Village, Bangka Belitung Islands, Indonesia

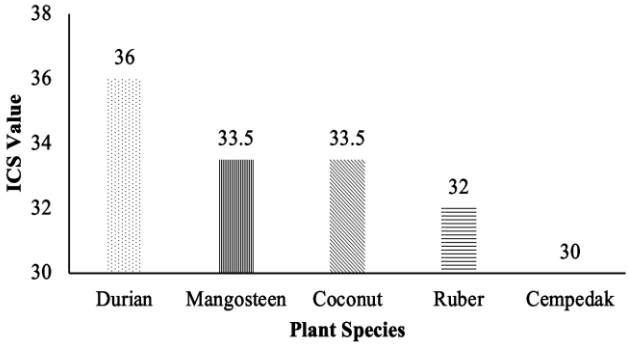

Figure 7. Plants found in *kelekak* in Air Mesu Village, Bangka Belitung Islands, Indonesia with the highest Index of Cultural Significance value

Plant species used by society have very diverse functions and essential values, depending on the needs and culture of the community. According to Luo et al. (2024), the Index of Cultural Significance is influenced by the frequency of mentioning a particular plant, its generality, frequency of use, parts used, multifunctionality, taste evaluation, and its role in food medical practices. Based on the results of observations, 86 plant species can be analyzed to assess the ICS for food, medicine, building materials, firewood, and spices.

There were five plant species that have an ICS value of more than 30 (Figure 7). The highest ICS value of the 86 identified plant species is durian (*D. zibethinus*) with 36. Durian has the highest ICS value because it has many uses, starting from the stem. as firewood and building materials, and the fruit is very popular. Durian is a tropical fruit called the king of fruits because of its taste. Other plant species with the highest ICS value are mangosteen (*G. mangostana*) and coconut (*C. nucifera*). Mangosteen is used as additional food, as a sap juice preservative, as firewood, and as cholesterol medicine. Mangosteen has good antioxidants and is very beneficial for the body. Mangosteen's secondary metabolites include xanthine, anthocyanins, phenolic acid, and proanthocyanidins (Widowati et al. 2020). As a result, mangosteen peel exhibits antioxidant, anti-inflammatory, anti-cancer, anti-hyperglycemic, anti-tumor properties, among others (Li et al. 2023). Coconut is used as additional food, medicine to reduce fever, building materials, firewood, and others.

In conclusion, there is a high diversity of plants found in the *kelekak* agroforestry of Air Mesu Village, Central Bangka with various benefits, habitus and parts used. The majority of plants in *kelekak* are utilized as food producing plants in the form of fruit which are eaten directly without processing. Based on the Index of Cultural Significance (ICS), the plant species with the highest ICS value is durian (*D. zibethinus*) due to its high benefits for food, building materials, and firewood. This finding highlights that existence of *kelekak* in Air Mesu Village is very beneficial for food security, besides having cultural and economic value for the community.

ACKNOWLEDGEMENTS

We would like to express our gratitude for the research funding provided by the Indonesian Endowment Fund for Education (LPDP) through the Equity Program (DAPT), specifically under the national research collaboration scheme/*Riset Kolaborasi Nasional* (Ri-Na) with the Grant No: 488/IT3.D10/PT.01.03/P/B/2023.

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