

# Traditional medicinal plants and their utilization by local communities around Lambung Mangkurat Education Forests, South Kalimantan, Indonesia

*by Mochamad Arief Soendjoto*

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## Traditional medicinal plants and their utilization by local communities around Lambung Mangkurat Education Forests, South Kalimantan, Indonesia

YUSANTO NUGROHO<sup>1</sup>, MOCHAMAD ARIEF SOENDJOTO<sup>1</sup>, SUYANTO<sup>1</sup>, JERIELS MATATULA<sup>2</sup>,  
SYAMSU ALAM<sup>3</sup>, PANDU YUDHA ADI PUTRA WIRABUANA<sup>4,\*</sup>

<sup>1</sup>Faculty of Forestry, Universitas Lambung Mangkurat, Jl. Ahmad Yani Km 36, Banjarbaru 70722, South Kalimantan, Indonesia

<sup>2</sup>Forestry Field Program, Politeknik Pertanian Negeri Kupang, Jl. Prof. Johannes, Lasiana, Kupang 85228, East Nusa Tenggara, Indonesia

<sup>3</sup>Faculty of Agriculture, Universitas Halu Oleo, Jl. HEA Mokodompit, Kendari 93231, Southeast Sulawesi, Indonesia

<sup>4</sup>Faculty of Forestry, Universitas Gadjah Mada, Jl. Agr. No. 1, Bulaksumur, Sleman 55281, Yogyakarta, Indonesia. Tel./fax.: +62-274-548815,

\*email: pandu.yudha.a.p@ugm.ac.id

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**Abstract.** Nugroho Y, Soendjoto MA, Suyanto, Matatula J, Alam S, Wirabuana PYAP. 2021. Traditional medicinal plants and their utilization by local communities around Lambung Mangkurat Education Forests, South Kalimantan, Indonesia. *Biodiversitas* 23: 306-314. Lambung Mangkurat Education Forests (LMEF) is a unique forest area with high plant diversity, including medicinal plants. This study aimed to document the list of natural medicinal plant species in LMEF and analyze the community perceptions on utilizing them. Exploratory surveys collected data through field observation and interviews with people living in villages around LMEF. The inventory of medicinal plants was conducted by line transect method with 1,000 m long and 20 m wide. Meanwhile, indigenous communities' description of medicinal plant utilization was explored using an interview process on fifty respondents. The results showed that 56 medicinal plant species were naturally distributed in LMEF. Most plants have habitus as trees, wherein local communities commonly use their leaves as traditional medicine. Local people generally applied the extraction process using hot water to obtain the benefit of these plants. Interestingly, more than 70% of respondents prefer traditional medicine to drugs. These findings indicated that the sustainable management of LMEF can support the vital role of forest ecosystems for people's health.

**Keywords:** Forest ecosystems, local communities, people health, plant diversity, traditional medicine

### INTRODUCTION

Lambung Mangkurat Education Forests (LMEF) is a special-purpose forest area in South Kalimantan. Universitas Lambung Mangkurat manages this area based on the Decree of the Ministry of Environment and Forestry Number SK. 900/MenLHK/Setjen/PLA.0/12/2016. According to the type of ecosystems, LMEF is classified as a tropical rain forest with a high diversity of flora and fauna. Besides managing as education and training forest, this site is also a conservation area. Therefore, the activity of natural resources utilization is relatively limited to protect this area from various disturbances and threats.

Various potential resources have been identified from LMEF. Some have been reported and published, such as birds (Purbaya et al. 2020), trees (Rusida et al. 2019; Wibisono et al. 2020), as well as local wisdom of the community (Firdaus et al. 2018; Andiani et al. 2019; Ariokta et al. 2020). However, other potentials have not been revealed, and among those potential resources, the existence of medicinal plants has become one of the essential information that should be investigated.

Medicinal plants are essential resources because many people require them for healing diseases. Moreover, these plants are safer for consumption than chemical drugs due to the low risk of side effects. The Dayaks as the main

inhabitants of the interior of Kalimantan use plants as traditional medicine since ancient time. Knowledge of traditional medicine from plants has been obtained from their ancestors and passed down from generation to generation (Az-Zahra et al. 2021).

Several previous studies from different locations have also reported the distribution of medicinal plants in a special-purpose forest area. For example, a study conducted in Rantau found forty-one species from various plant habitus (Suryanto and Syaifuddin 2017). Another similar study in Samboja found approximately thirty-seven medicinal plants naturally distributed in the special purpose forest area (Wibisono and Azham 2017). However, the data of medicinal plants from LMEF are still unavailable even though this information is required to preserve biodiversity in this area.

This study aimed to analyze the potential of medicinal plants naturally distributed in LMEF and their utilization by the local community living around this area. This information is not only a complement to the report on the database of many special-purpose forest areas of Indonesia. However, it can be used as materials for socializing the sustainability of these biological resources to the community around LMEF and as research material to enrich pharmaceutical science and technology for academic

members of Universitas Lambung Mangkurat, South Kalimantan, Indonesia.

## MATERIALS AND METHODS

### Study area

The medicinal plants' inventory was conducted at the northern area of LMEF. The geographic coordinates for this site are located in E114°54'00" to 114°58'00" and S3°30'00" 3°34'00". This area is in East Mandiangin and Kiram Village, Karang Intan District, Banjar Regency, South Kalimantan, Indonesia (Figure 1). Meanwhile, the data about community perception for medicinal plants utilization were collected from the local people in the East Mandiangin Village. This village is the closest rural to the LMEF and can be accessed using a motorcycle or car.

### Data collection

The process of data collection was undertaken from June to August 2020. Medicinal plants were recorded using the cruise method in about 20,000 m<sup>2</sup> and this rectangular area is formed from a straight cruising path of one-kilometer-long and 20 m wide. Plants are grouped into five habitus: grasses, herbs, shrubs, lianas, and trees. Grasses belong to the Poaceae and Cyperaceae families (Soendjoto et al. 2014), while herbs or shrubs refer to non-woody plants. Shrubs refer to woody plants with many branches but a maximum height of about 3 m. Meanwhile, liana is a climber who needs other plants (hosts) to stand upright to propagate or climb. Tree is a general term for woody plants with three or four growth stages: seedlings, saplings, poles,

and trees. Seedlings are woody plants whose height is <1.5 m above the ground. Saplings are woody plants with a height of 1.5 m and a diameter at breast height (at the height of 1.3 m from ground level) <10 cm. Poles are woody plants whose diameter is in the range of 10 <20 cm, while trees are those with a diameter of 20 cm (Soendjoto et al. 2014). For woody plants with three growth stages by excluding the pole growth stage, a diameter of 10 cm is categorized as a tree.

Interviews were conducted with fifty respondents considered healers and the public directly using medicinal plants to identify the components that functioned as medicine and their utilization. The respondents consisted of 40 men and 10 women with more than 40 years of age. All of these respondents are residents of East Mandiangin Village, whose total population is 496 households. From this interview, specific information can be obtained, including plant species and how to use them as medicinal plants and people's perceptions of these plants.

### Data analysis

Descriptive analysis was applied to demonstrate the results by tabulating the information into a specific table. This consists of a family name, scientific name, and local name of the plant, plant habitus, plant part used as medicine, the name of the disease or disorder that is cured, and the method of processing that part of the plant. Public perception consists of positive, negative, and no opinion. All three are expressed in percentage, which is the ratio of the answers to the questionnaire submitted.

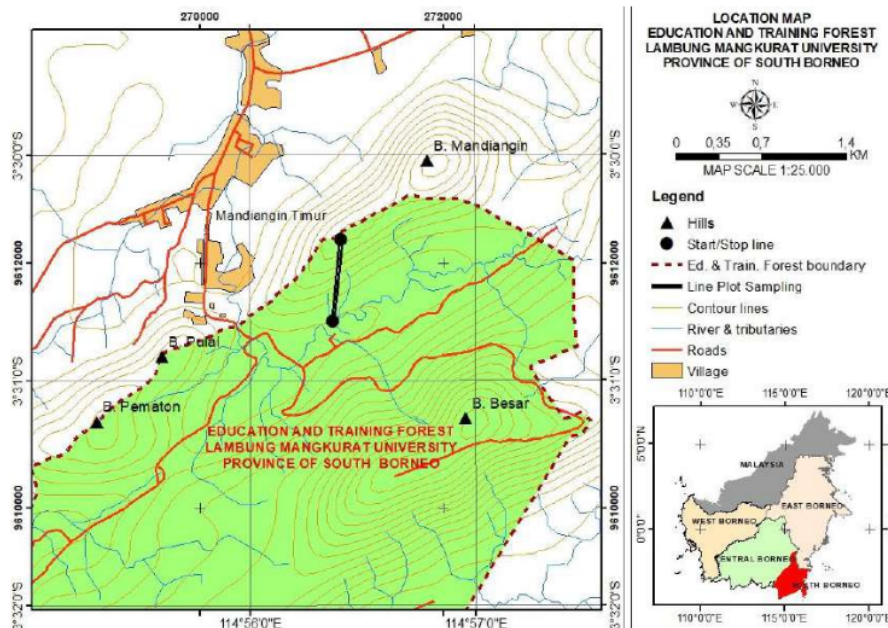


Figure 1. Map of study site in Lambung Mangkurat Education Forest, South Kalimantan, Indonesia

## RESULTS AND DISCUSSION

### Medicinal plants species in Lambung Mangkurat Education Forest

Fifty-six species belonging to 37 medicinal plant families were found in LMFE (Table 1). As mentioned above, this number is higher than the plant species reported from several KHDTKs in Indonesia. However, based on the following two situations, that number is relatively small.

First, medicinal plant species were obtained from an area of 2 hectares or only 0.12% of the total area of LMFE. This is classified as very small considering LMFE reaches 1,627 hectares. Second, other species are categorized as medicinal plants in LMFE but were not found in the data collection area. Four of these species are balik angin (*Alphitonia excelsa*) (Rusida et al. 2019), kimalaka (*Phyllanthus emblica*) (Matnasir et al. 2020), pulantan (*Alstonia scholaris*) (Wibisono et al. 2020), and tikusan (*Clausena excavata*) (Paradika et al. 2021). Balik angin known as the soap tree (Thompson et al. 2019), has the potential, among others, for chemical therapy for the prevention and treatment of urinary infections, autoimmune diseases, and gastrointestinal bleeding (Cock 2020). Kimalaka has potential as a treatment for diarrhea, inflammation (Krishnaveni and Mirunalini 2010), sore throat and as a refreshing drink (Rahman et al. 2013), antioxidant (Suzery et al. 2013), and anti-obesity (Ardiansyah et al. 2018). Pulantan has potential as an antitoxoplasma (Abraham et al. 2014), antidiabetic (Tambunan et al. 2016), antioxidant (Zuraida et al. 2017; Thahira et al. 2021), and antimicrobial. Finally, tikusan has the potential as antioxidants (Arbab et al. 2011), anti-cancer, wound healing (Albaayit et al. 2015), as well as antioxidants and anti-diabetic (Thant et al. 2019).

The habitus of medicinal plants that are most often used were trees (50%). The next habitus were lianas, herbs or shrubs, and grasses (Figure 2A). Trees are also the most widely used as a source of medicine by the Manobo Tribe, Philippines (Dapar et al. 2020).

The plant with the highest utilization ratio (33%) was the leaf, and other parts that were used (respectively from high to low ratio) were stems, roots, fruit, flowers, and sap (Figure 2B). Leaves are more widely used because their secondary metabolite content is more diverse (Assi et al. 2017; Jain et al. 2019; Fatmawati et al. 2020; Gurning and Sinaga 2020), the content of medicinal ingredients is strong or high (Malini et al. 2017), the availability are more abundant (Mustofa et al. 2020), harvesting is easier (Malini et al. 2017; Mustofa et al. 2020). Furthermore, leaves do not directly impact plant death (Qamariah et al. 2020), and after harvesting, they can quickly grow back (Qamariah et al. 2020).

Leaves are part of medicinal plants with the highest utilization ratio by various ethnic groups. However, the level of utilization ratio for each ethnic group is different. In Indonesia, such a situation is found in the Karo ethnicity in North Sumatra (Affandi and Batubara 2019), the Kaili

ethnic group, Central Sulawesi (Ifandi et al. 2016), the Tengger ethnic group in East Java (Jadid et al. 2020), the community of Karangwangi Village, Cianjur, West Java (Malini et al. 2017), three ethnic groups (Banjar, Bugis, Dayak) in Tanah Bumbu Regency, Kalimantan Selatan (Radam et al. 2016), Ethnic Mamuju, Sulawesi West (Syamsiah et al. 2016), and four Dayak sub-ethnics in West Kalimantan (Yusro et al. 2014). Outside Indonesia, ethnic groups or communities that use leaves as the main part of plants in medicine include the Tolai community, Papua New Guinea (Bureng et al. 2016), the Manobo Tribe, the Philippines (Dapar et al. 2020), the Bilaspur Village community, India (Patel 2014), the Ayta community, Philippines (Tantengco et al. 2018), and Sheikhpura, Pakistan (Zahoor et al. 2017).

### Preparation of plants in medicine

The plant parts are eaten (including chewing), swallowed, drunk, or gargled to treat diseases or cure disorders from within the body. Outside the body, the medicinal plant is attached, smeared, washed, splashed or used as a washing agent, rubbed, inhaled, or left in the air to repel nuisance animals. However, the plant should be prepared by additional ingredients, crushing, or burning. The medicinal plant parts are chewed, kneaded, pulverized, pounded, or boiled to crush it, depending on the hardness of the parts.

There are four boiling records identified from this study. First, two forms are used after boiling: (1) solids from medicinal plants are eaten, or (2) boiled liquids are drunk. Second, boiling refers to the process of putting plant parts into a container filled with water with a specific volume and cooking over a fire until the water boils or the volume decreases. Suharjito et al. (2014) revealed that the boiling carried out in two ways depends on the part of the medicinal plant used: (1) boiling the water in which there are medicinal plant parts or (2) soaking the medicinal plant part in hot water. Third, no specific data were obtained regarding the container and stirrer. In a study in Semarang, Central Java, Sumarni et al. (2019) mentions that the container used to boil the medicinal plant parts is *Kuali* (a clay cauldron/pot/kettle), and the stirrer is made of wood or stone. The clay cauldron reduces the efficacy of medicinal herbs. It was reported that the people of Kalimantan Selatan are not familiar with the boiling and stirring tools commonly used in Central Java. Fourth, there are no data related to the drying of medicinal plants before being served or given treatment. Sumarni et al. (2019) noted that drying is an initial process before parts of the plants are boiled, and the aim is to prevent the absorption of sap in the body when drunk.

Boiling is the process most often conducted in the preparation of drugs, and the frequency reaches more than 43% (Figure 3). For example, the Kanayatn Dayak Ethnic in West Kalimantan boils medicinal plants to dissolve the active ingredients quickly in water and heal faster after drinking the boiled water (Sari et al. 2021).

**Table 1.** List of medicinal plants found in Lambung Mangkurat Education Forest and their utilization by the local community

Family, species, and local name	Plant habitus	Parts of the plant used	Types of diseases/disorders and preparation of medicinal plants
<b>Anacardiaceae</b>			
<i>Anacardium occidentale</i> ; jambu mete	Tree	Leaves	Diarrhea treatment. Seven leaves are boiled in 2 cups of boiling water ( $\pm$ 500 ml). This boiled water is then drunk.
<b>Annonaceae</b>			
<i>Cyathostemma viridiflorum</i> ; larak pisang	Liana	Fruits	Blackening hair. Ripe fruit is kneaded, mixed with enough water, and rubbed on the head's hair
<i>Annona muricata</i> ; sirsak	Tree	Leaves	Stomach pain medicine. The leaves are dipped in kerosene and then placed on the belly or navel
<b>Apocynaceae</b>			
<i>Alstonia angustiloba</i> ; tampar badak	Tree	Sap	Blood vomiting medicine. The sap from the stem wound is mixed with sugar and then drunk
<b>Areaceae</b>			
<i>Arenga pinnata</i> ; aren	Tree	Root	Back pain medicine. The roots are boiled, and the boiled water is drunk
<i>Calamus caesius</i> ; rotan	Liana	Stem	Headache medicine. The dried stems are burned, and the smoke is inhaled
<i>Korthalsia ferox</i> ; rotan pilak	Liana	Stem	Medicine for heartburn/stomach pain. Umbut (main stem that just grows) is cleaned and then eaten directly
<b>Asparagaceae</b>			
<i>Dracaena</i> sp.; pudak gunung	Herb	Leaves	Anti-venom from animal bites. Leaves that have been chewed or kneaded and given enough water are attached to the affected part of the bite
<b>Asteraceae</b>			
<i>Chromolaena odorata</i> ; kirinyuh	Shrub	Leaves	Antibiotics for wounds. The crushed leaves are attached to the injured part
<i>Elephantopus scaber</i> ; tapak liman	Herb	Leaves	Glandular swelling medication. The kneaded young leaves are mixed with salt and then applied to the swollen area.
<i>Gynura procumbens</i> ; daun sambung	Herb	Leaves	Remedy for itching. The crushed leaves are put in a bucket of water. This water is used for bathing.
<b>Blechnaceae</b>			
<i>Stenochlaena palustris</i> ; kelakai	Shrub	Leaves	Low blood pressure medication. Young leaves are boiled for later as culinary or food (oseng-oseng).
<b>Cannabaceae</b>			
<i>Trema tomentosa</i> ; balik angin	Tree	Stem	Anti-mosquito bites. The bark is directly applied to the body.
<b>Convolvulaceae</b>			
<i>Merremia peltate</i> ; bilaran tapah	Liana	Stem	Cough medicine and anti-cancer. The stem is cut, and the water from the cut stem is drunk.
<b>Euphorbiaceae</b>			
<i>Euphorbia lathyris</i> ; sampai ringan	Herb	Leaves	Blood cough medicine. Young leaves (shoots) are chewed. After feeling crushed, the chew is swallowed.
<b>Fabaceae</b>			
<i>Caesalpinia</i> sp.; sembilikan, asam daun	Liana	Stem	Cough medicine. The stems are cut, and the water that comes out is drunk. Another way is to boil the stems and drink the boiled water.
<i>Cassia alata</i> ; gulinggang	Shrub	Leaves	Medication for tinea versicolor or ringworm. The leaves are kneaded and then rubbed on the affected body parts. Another way, after kneading, the leaves are mixed with a bit of kerosene and then rubbed on the body.
<i>Derris</i> sp.; tatau	Liana	Stem	Medicine for bloody stools or internal sores. The stem is cut, and the water that drips or comes out of the cut stem is drunk.
<i>Archidendron pauciflorum</i> ; akar jengkol	Tree	Root	Medication to lower blood glucose levels. Roots about 5 cm are boiled, and the boiled water is drunk.
<i>Mimosa pudica</i> ; putri malu	Herb	Root	Back pain medicine. The roots are boiled, and the boiled water is drunk.
<i>Pterocarpus indicus</i> ; angšana	Tree	Stem (bark)	Genital medicine. The bark is boiled, and the boiled water is drunk.
<b>Flagellariaceae</b>			
<i>Flagellaria indica</i> ; paikat laki	Liana	Leaves	Drugs for boosting/maintaining stamina or male virility. Leaves or young leaves are boiled, and the boiled water is drunk.
<b>Lamiaceae</b>			
<i>Vitex ovata</i> ; alaban tulang	Tree	Stem (bark)	Diabetes medication. The bark of 5 cm wide is boiled, and the boiled water is drunk.

**Lauraceae**

<i>Eusideroxylon zwageri</i> ; ulin	Tree	Leaves	Blackening hair or anti grey hair. Leaves (shoots) are washed on the hair
<i>Litsea</i> sp.; madang telur	Tree	Stem (bark)	Mosquito repellent, for example, when in the forest. The bark is burned, and the smoke is used to repel mosquitoes.

**Marantaceae**

<i>Donax cenniformis</i> ; bamban batu	Shrub	Stem	Cough medicine. The stem is cut, and the water that drips or comes out of the cut stem is then drunk directly.
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**Melastomaceae**

<i>Melastoma malabatricum</i> ; senduduk	Shrub	Flowers	Cough medicine. Flowers are pulverized or crushed until smooth and then eaten or swallowed.
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**Meliaceae**

<i>Aglaiia</i> sp.; kilayu	Tree	Leaves	Medication for chickenpox or herpes. The leaves are ground and then applied to the body parts, especially those affected by chickenpox.
<i>Lansium domesticum</i> ; langsung	Tree	Stem (bark)	Medication for diarrhea or stomach problems. The bark is boiled, and the boiled water is drunk.
<i>Swietenia mahagoni</i> ; mahoni	Tree	Stem (bark)	Medication for wet wounds or scabs. Bark measuring about 10 cm x 10 cm is cut into small pieces and boiled. Boiling water is used to wash scabs.

**Menispermaceae**

<i>Arcangelica flava</i> ; akar kuning	Liana	Root	Liver or hepatitis drugs. The roots are boiled, and the boiled water is then drunk.
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**Moraceae**

<i>Artocarpus dadah</i> ; tampang	Tree	Leaves	Stomach problem medicine. The young leaves are boiled, and the boiled water is drunk.
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**Myrtaceae**

<i>Tristaniopsis</i> sp.; jawaling	Tree	Leaves	Insect repellent (such as mosquitoes). The leaves are burned, and the smoke is insect repellent.
<i>Syzigium polyanthum</i> ; salam	Tree	Leaves	Hypertension medication. Five leaves are boiled, and the water is drunk.
<i>Tristaniopsis merguensis</i> ; pelawan	Tree	Stem	Liver medicine. The stem is cut, and the dripping liquid is drunk.

**Oxalidaceae**

<i>Averrhoa bilimbi</i> ; belimbing wuluh/tunjuk	Tree	Flowers or fruits	1. Drugs for tinea versicolor. The flowers or fruit are ground and rubbed on the affected body parts. 2. Sprue medication. Flowers or fruit are boiled, and the boiled water is used for gargling.
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**Passifloraceae**

<i>Passiflora foetida</i> ; permot, bilaran kusam	Liana	Stem	Diabetes medication or blood-glucose-lowering. The 40 cm long stem is boiled, and the boiled water is drunk.
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**Phyllanthaceae**

<i>Baccaurea javanica</i> ; limpasu	Tree	Root	Fever medicine. The roots are boiled, and the boiled water is drunk.
<i>Phyllanthus debilis</i> ; ambin-ambin buah, meniran	Herb	Root	Back pain medicine. The roots are boiled, and the boiled water is drunk.

**Poaceae**

<i>Imperata cylindrica</i> ; alang-alang	Grasses	Root	Back pain medicine. The roots of about ten clumps are tied up and then boiled. The boiled water is drunk.
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**Primulaceae**

<i>Labisia pumila</i> ; rumput fatimah	Herb	Root	Natural contraceptives. The roots are boiled, and the boiled water is drunk every day.
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**Rhamnaceae**

<i>Ziziphus</i> sp.; teja	Tree	Root	Post-partum recovery. The roots are boiled, and the boiled water is drunk.
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**Rubiaceae**

<i>Morinda citrifolia</i> ; carikan, mengkudu	Tree	Stem	Bloody stool medicine. The stems are chopped and boiled. Finally, the boiled water is drunk.
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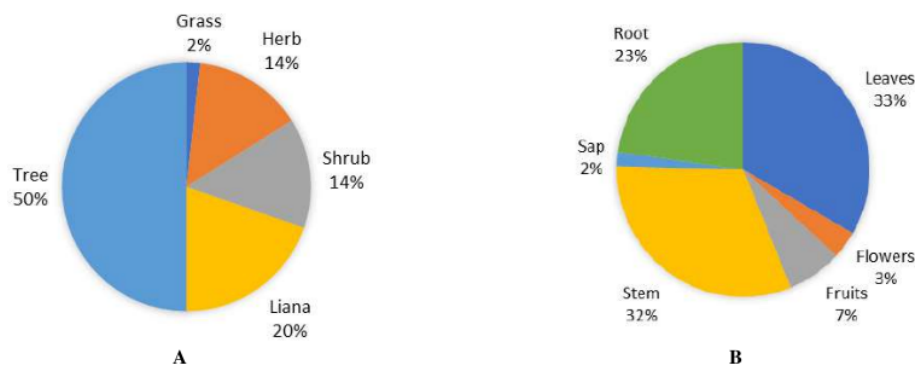
**Rutaceae**

<i>Luvunga eleutheandra</i> ; seluang belum	Liana	Root	Stamina-boosting drug. The roots are boiled, and the boiled water is drunk.
<i>Euodia aromatica</i> ; wangun gunung	Tree	Leaves	Remedy for itching and hives. The young leaves are ground and then applied to the itchy area.

**Salicaceae**

<i>Flacourtia rukam</i> ; rukam	Tree	Leaves	Eye pain medicine. Young leaves (7 pieces) crushed by pounding and mixed with water. The obtained liquid is filtered. The filtered liquid is used to clean the eye.
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<b>Santalaceae</b> <i>Santalum album</i> ; cendana	Tree	Stem (bark)	Internal medicine (gastric ulcers, stomach pain, stomach acid). The bark is boiled, and the boiled water is then drunk.
<b>Sapotaceae</b> <i>Mimusops elengi</i> ; tanjung	Tree	Stem (bark)	Drugs for insomnia (difficulty sleeping). The bark measuring about 5 cm x 5 cm is boiled with a glass of water until it boils. Boiled water that has been cooled and then drunk.
<b>Simaroubaceae</b> <i>Brucea javanica</i> ; marsihung	Shrub	Fruits	Malaria drugs. Ripe fruit is pounded and then swallowed directly.
<i>Eurycoma longifolia</i> ; pasak bumi	Tree	Root	Back pain medicine and stamina-boosting drug. The roots are boiled, and the boiled water is drunk. Roots can still be reused at least three times of use.
<b>Tiliaceae</b> <i>Muntingia calabura</i> ; kersen	Tree	Leaves	Diabetes medication. The leaves are boiled, and the boiled water is drunk.
<b>Urticaceae</b> <i>Laportea macrostachya</i> ; jelatang	Shrub	Root	Medicine for itching and swelling due to touching or being touched by jelatang leaves. The root is applied to the itchy or swollen part.
<b>Verbenaceae</b> <i>Peronema canescens</i> ; sungkai	Tree	Leaves	Malaria drugs. The tops of the leaves are crushed and swallowed immediately. Stamina-boosting drug. The leaves are boiled, and the boiled water is then drunk.
<b>Vitaceae</b> <i>Tetrastigma</i> sp.; ulur-ulur	Liana	Stem	Medication for vomiting blood, internal bleeding, or ambient. The stems are cut, and the water that drips from the stems is then drunk.
<i>Leea indica</i> ; mali-mali	Shrub	Fruits	Wart remover. Ripe fruit (blackish color) pounded until crushed. This fruit mash is applied to the wart site for several repetitions.
<b>Zingiberaceae</b> <i>Zingiber cassumunar</i> ; banglai warik	Herb	Root (rhizome)	Medicine for itching or allergies. The rhizomes are cleaned, peeled, and then grated. Grated rhizome attached to the itchy parts.

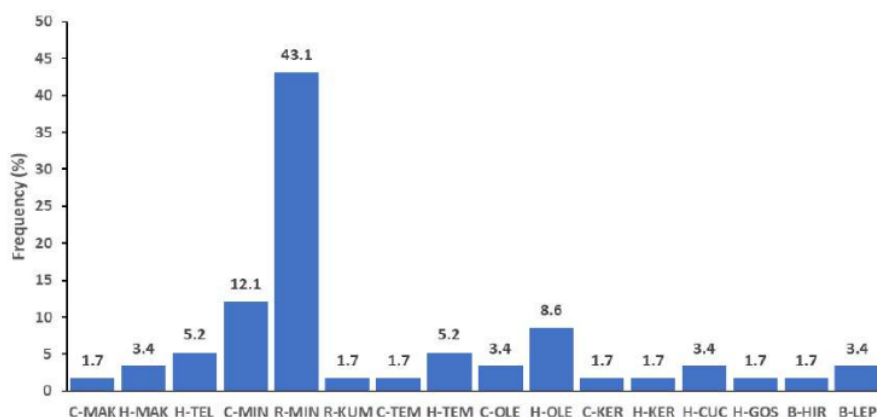


**Figure 2.** The ratio of utilization of plant habitus (A) and plant parts as a source of medicine (B)

### People perception of medicinal plants

The people of Mandiangin Timur Village have been touched by modern culture. For example, they can go back and forth to the nearest town (Banjarbaru), only about 15 km away by 2-wheeled or 4-wheeled vehicles via asphalt roads. Subsequently, all respondents have used mobile

phones to communicate because the internet network has been operated in this village. With this tool, people can communicate faster and get or access knowledge about modern medicines more efficiently. However, most people (74.0%) positively perceive traditional medicine that uses medicinal plants (Table 2).



**Figure 3.** Frequency of drug preparation from plants and how to use them. C-MAK: parts of medicinal plants eaten with or without a mixture of other ingredients, H-MAK: medicinal plant parts are crushed before being eaten, H-TEL: medicinal plant parts are crushed before being swallowed, C-MIN: liquid medicinal plants taken with or without a mixture of other ingredients, R-MIN: parts of medicinal plants are boiled before the boiled water is drunk, R-KUM: parts of medicinal plants are boiled before gargling the boiled water air, C-TEM: parts of medicinal plants affixed with or without a mixture of other materials, H-TEM: parts of medicinal plants are crushed before being pasted, C-OLE: parts of medicinal plants are applied with or without a mixture of other ingredients, H-OLE: medicinal plant parts are crushed before being applied, C-KER: parts of medicinal plants are washed with or without a mixture of other ingredients, H-KER: medicinal plant parts are crushed before washing, H-CUC: medicinal plant parts are crushed before being used to wash things, H-GOS: medicinal plant parts crushed before rubbing, B-HIR: parts of medicinal plants are burned, and the smoke from the combustion is inhaled, B-LEP: parts of medicinal plants are burned, and the smoke from the combustion is released into the air

**Table 2.** People perception of treatment using medicinal plants

People perception	Ratio (%)	Reasons
Positive	74	Traditional medicine is natural, has no side effects, is cheap and easy to get; is a choice of chemical drugs; does not require a doctor's prescription.
Negative	20	Traditional medicine is doubtful because there has been no test from a doctor; it is feared that it has side effects, is not practical, and is inefficient.
No opinion	6	People do not know and have never used it.

Positive perceptions overcome the negative stigma associated with the use of medicinal plants. First, the dose to treat a particular disease is uncertain. This uncertainty arises from transferring knowledge more often orally than in writing. Second, the parts and species selected depend heavily on the experience and expertise of the healer (shaman), which allows significant differences between a healer and another. This is because it is not easy to find explanations about medicinal compounds made by healers (Suharjito et al. 2014). Third, medical history, body size or components, and the user's health condition at the time of treatment (such as weight and blood pressure) are rarely considered.

The positive perception is in line with the condition that traditional treatment is still applied by almost 80% of the

world's population (Mbuni et al. 2020). This constitutes people on the African continent, such as communities around Cherangani Hills, Western Kenya (Mbuni et al. 2020); Asian continents, such as the Temiar Tribe in Kelantan, Peninsular Malaysia (Zaki et al. 2019); Americas, such as Mexico, Central America, and the Caribbean (Alonso-Castro et al. 2016); Australian continent, such as Dharawal Aboriginal people, Australia (Akhtar et al. 2016); European countries, such as Belgium, France, Germany, and the Netherlands (Hoareau and Da Silva 1999). In this perspective, the positive trend of returning to nature may increase since the pandemic spread worldwide, and treatment has not been found. Plants that can prevent or treat Covid-19 were studied, among others, by Khan et al. (2021) and Lim et al. (2021).

In conclusion, the study identified 56 medicinal plant species of 37 families found in all habitus (underplants, shrubs, lianas, and trees) in LMFE. These identified species can be used to treat 28 types of diseases; the part widely used for treatment is the leaves, and the processing method is mostly by boiling.

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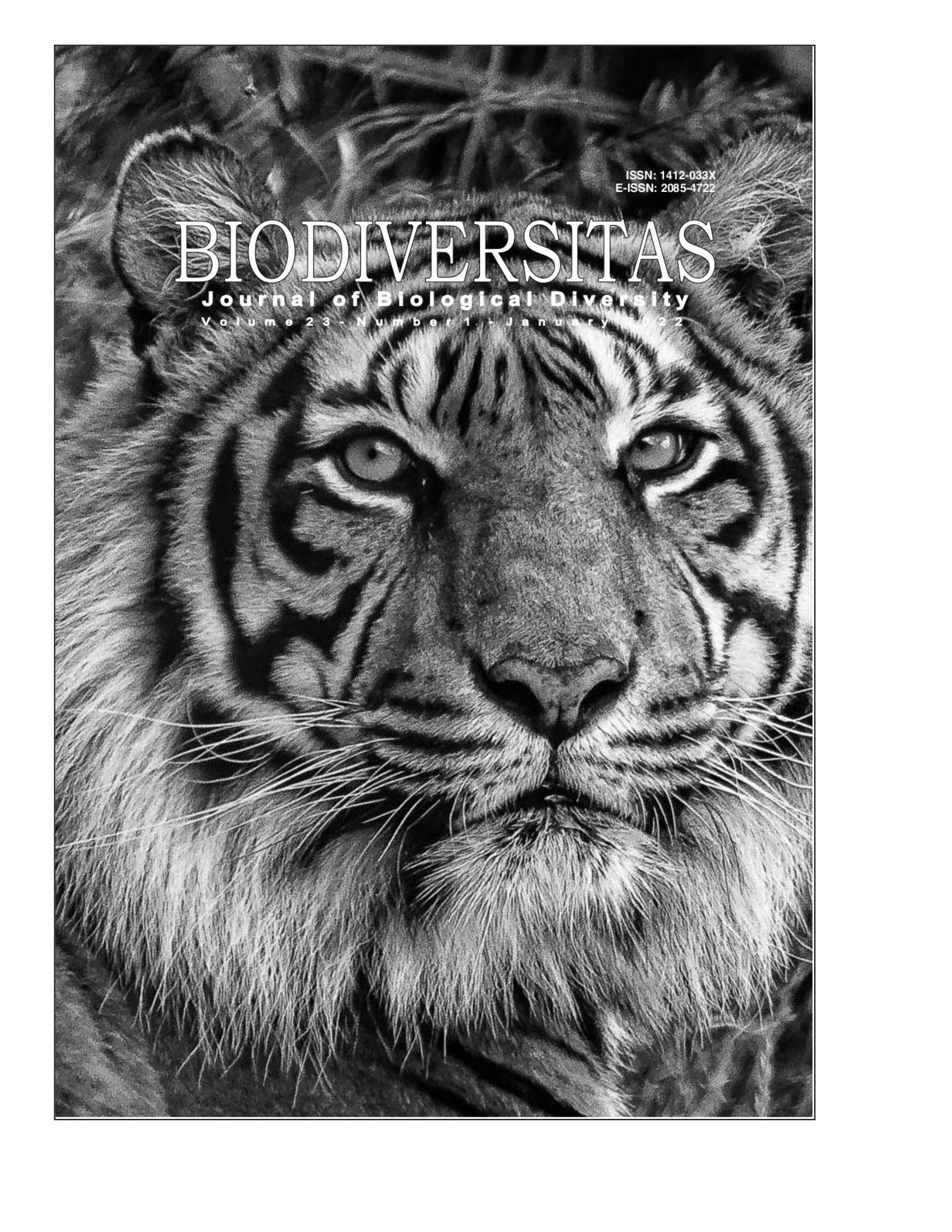
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*Front cover: Panthera tigris sumatrae* (Pocock, 1929)  
(PHOTO: SMUDGE 9000)

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