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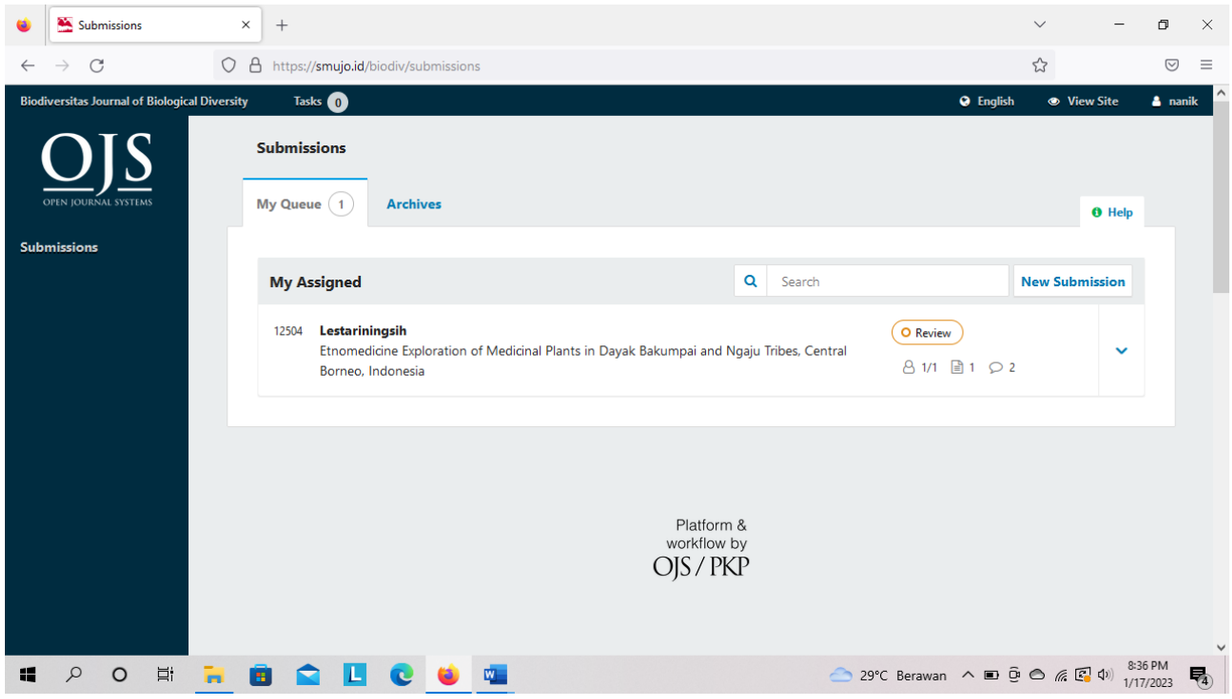

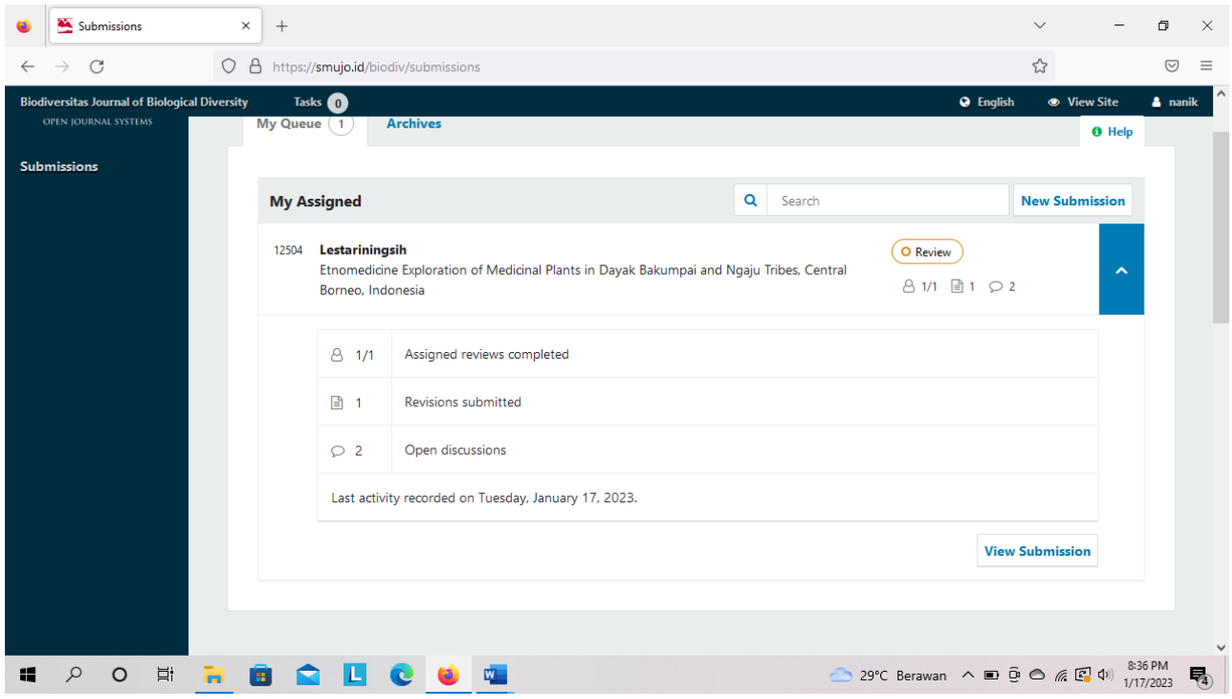

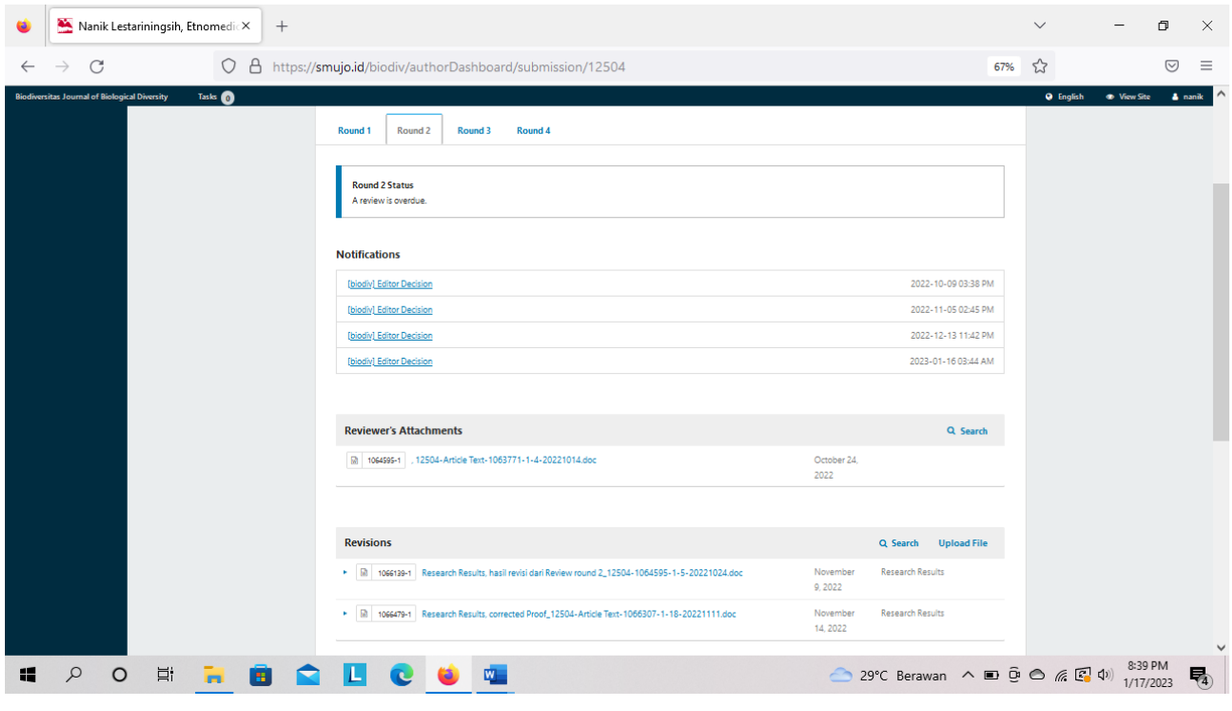

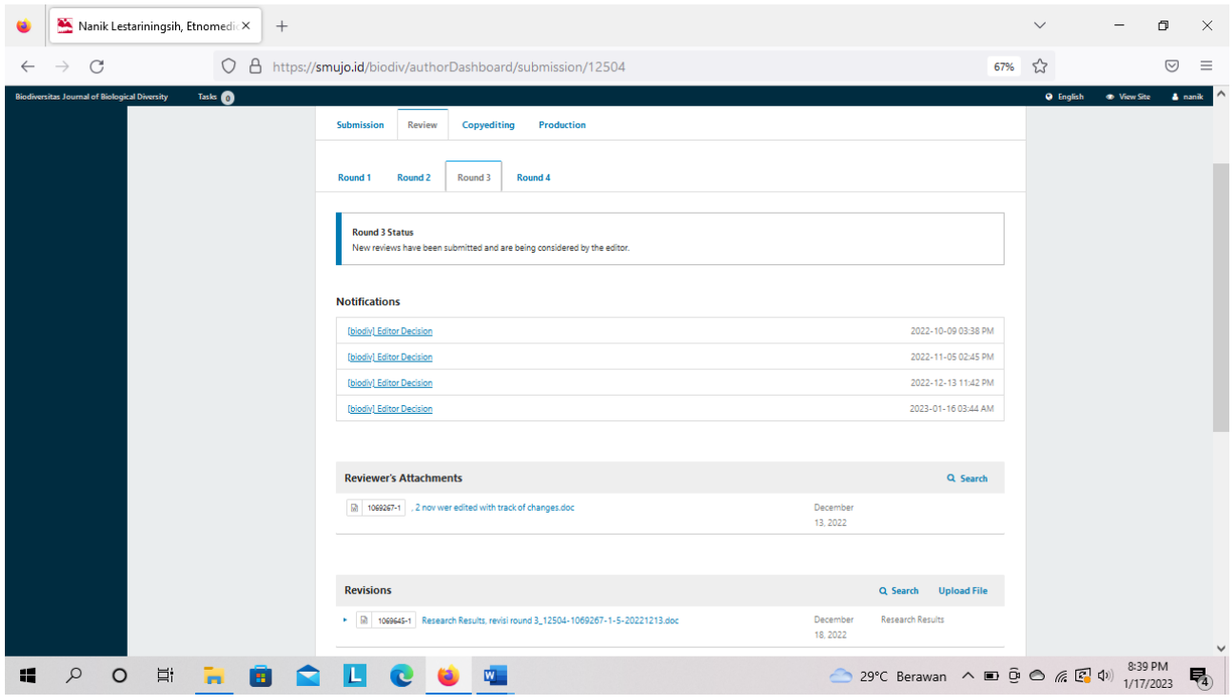

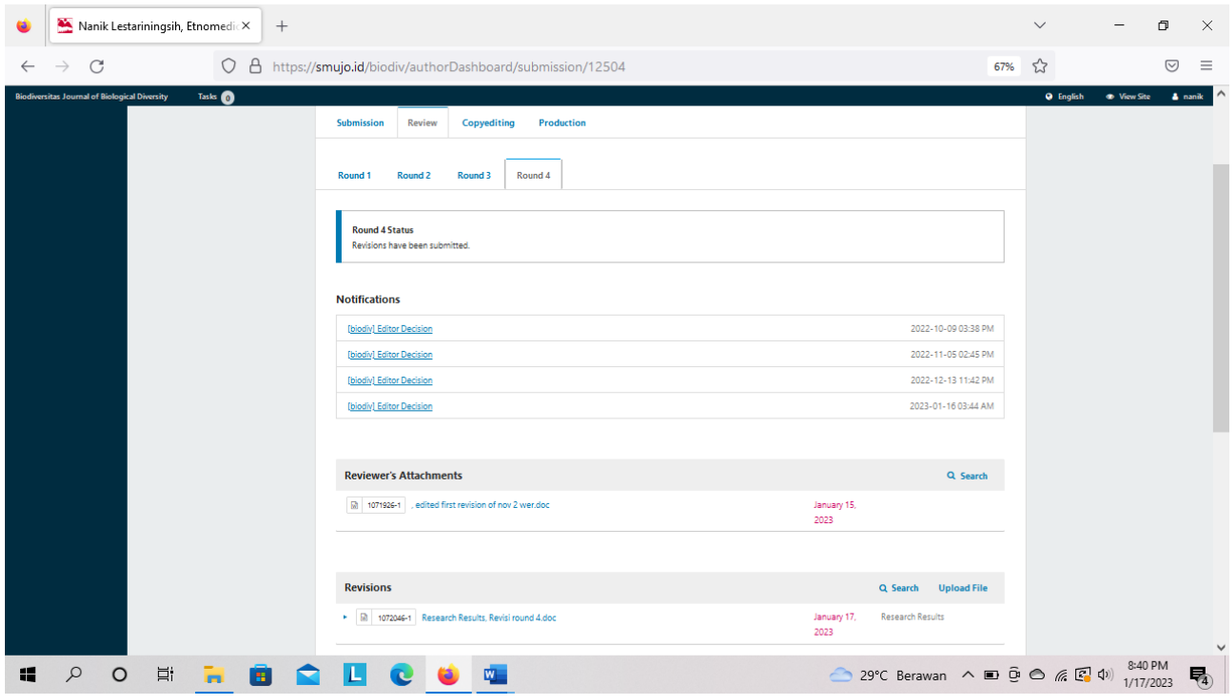

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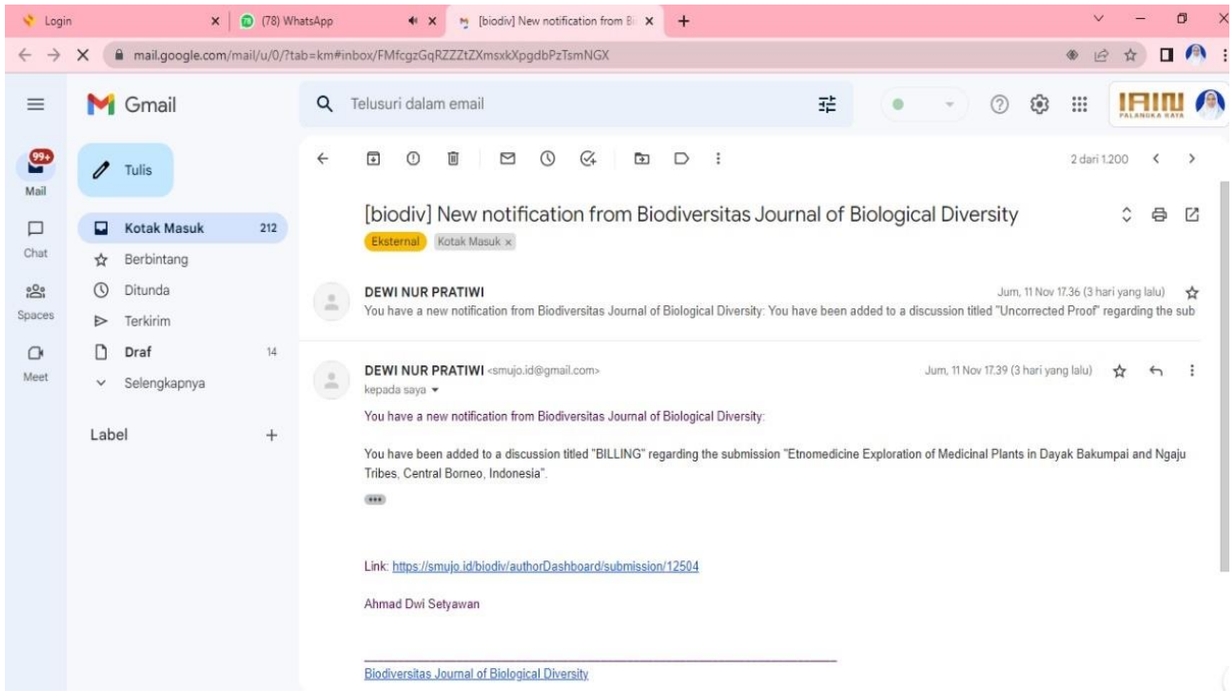

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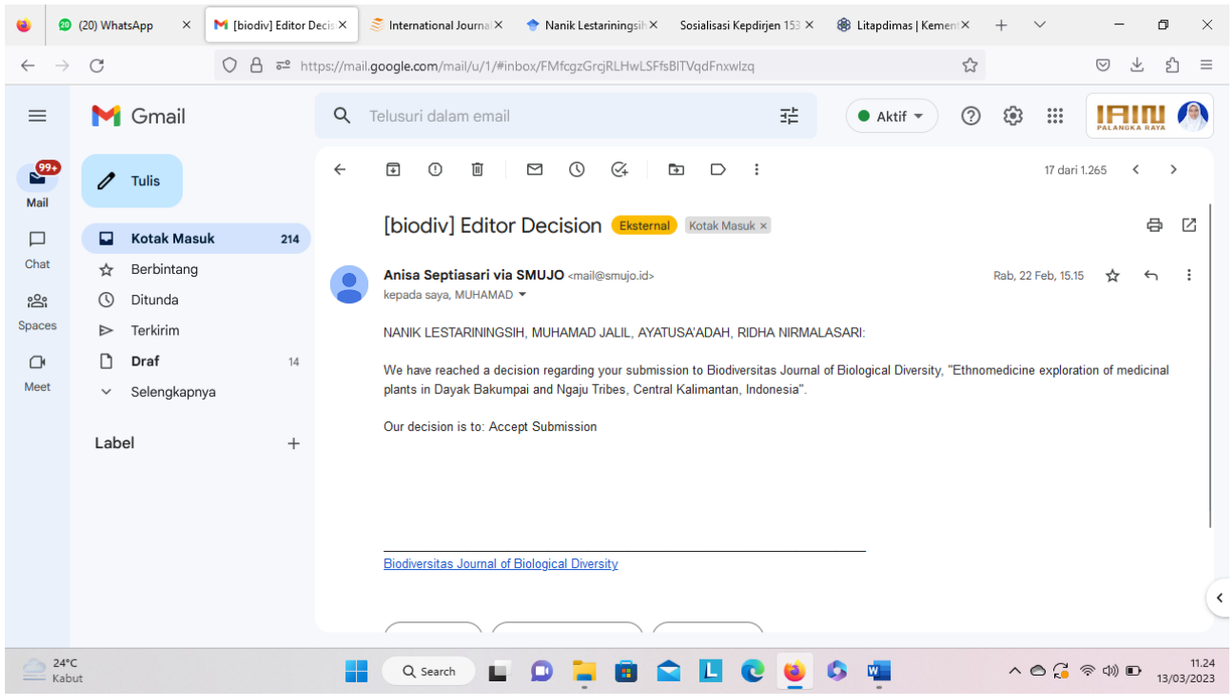

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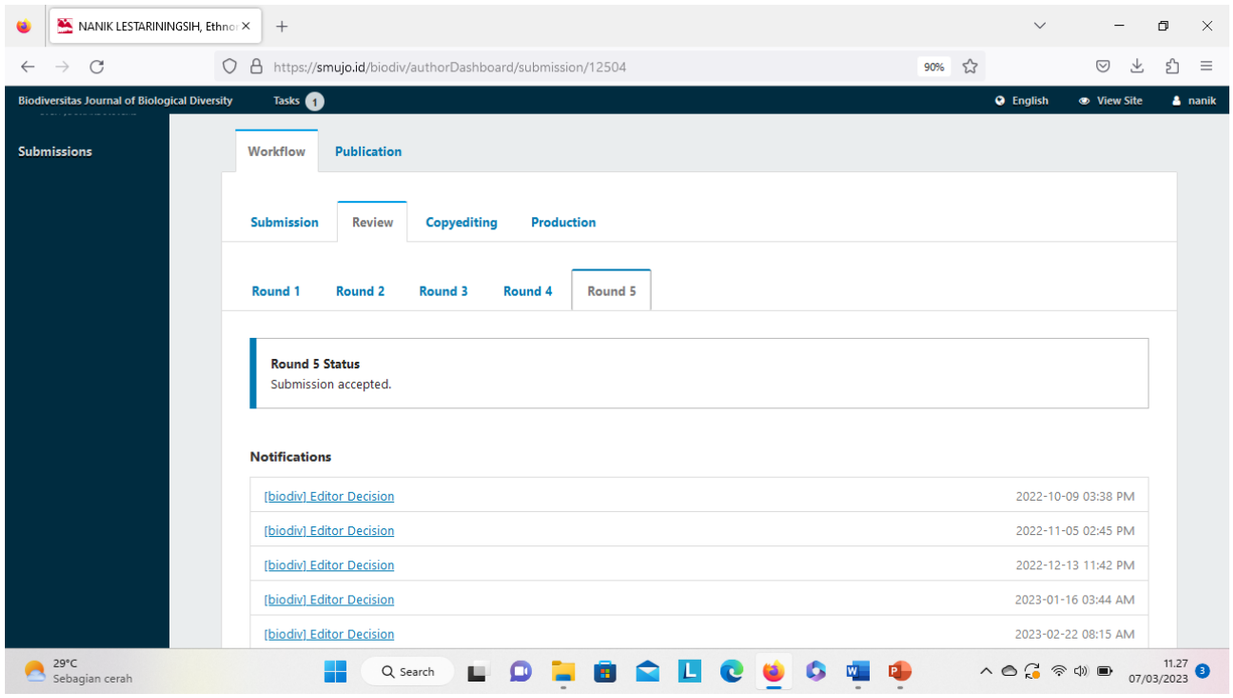

Judul jurnal : Ethnomedicineexploration of medicinal plants in Dayak Bakumpai and Ngaju Tribes, Central Kalimantan,Indonesia

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Ethnomedicine exploration of medicinal plants in Dayak Bakumpai and Ngaju Tribes, Central Kalimantan, Indonesia

Abstract. *Lestaringsih N, Jalil M, Ayatusa'adah, Nirmalasari R. 2022. Ethnomedicine exploration of medicinal plants in Dayak Bakumpai and Ngaju Tribes, Central Kalimantan, Indonesia. Biodiversitas 23: 5962-5973.* Dayak Tribes in Central Kalimantan, Indonesia, still utilize traditional medicines from parts of plants as a hereditary inheritance. Knowledge about traditional medicines, however, has not been well documented, and most of the young generation of traditional gatherer families do not want to be a gatherer. This could lead to the loss of tradition in concocting traditional medicine. Therefore, the research ~~aims~~ aimed to conserve and preserve local wisdom by documenting traditional medicinal plants used by gatherers and communities of the Dayak Bakumpai and Ngaju Tribes. ~~Moreover, it aims to gather data on the use value of the traditional medicinal plant species of the Dayak Tribes.~~ The research ~~focuses~~ focused on the ethnomedicine exploration of the Dayak Ngaju Tribe in Seruyan and Katingan and Dayak Bakumpai in Muara Teweh and Kapuas. Samples ~~are~~ were taken purposively ~~and~~ using a snowball sampling that ~~results~~ resulted in 42 volunteered key informants. The key informants are interviewed using a semi-structured questionnaire. The knowledge and practice of medicinal plants ~~are~~ were analyzed using descriptive statistics of percentages. The research results indicate that the role of the gatherers and *Batra* in Borneo is significant since they have knowledge of ethnomedicine in the efforts to maintain health and conserve the surrounding plants. A total of 60 plant species are mixed by the *Batra*/local people and spread into 36 families. Species mostly found are from the Fabaceae and Lauraceae families. The use value of the species in the Dayak Tribe medicinal plants ~~is~~ was in the range of 0.02-0.1, with the largest UVc value found in the species of *Eurycoma longifolia* Jack., *Tinospora crispa* Miers., *Planchonia valida* BI., *Ficus deltoidea* Jack., and *Morus alba* L. More surveys are suggested regarding traditional medicines with their chemical profile and pharmacological examination, especially in rural areas that still use traditional medicines.

Keywords: Ethnomedicine, medicinal plants, Dayak Tribe

INTRODUCTION

World Health Organization (WHO) defines ethnomedicine or traditional medicine as knowledge, skills, and practice based on theories, beliefs, and experiences of various cultural habits used in health care, prevention of diseases, and improvement of physical and mental performance and have been used from generation to generation (Choi 2008). Herbal medicine or traditional herbs have been developed and promoted by Muslim countries and China (Mojtaba et al. 2015). The herbs are used as a medicine to prevent diseases (Yaniv 2014). In addition, traditional herbs play a significant role in fulfilling the primary health need of communities living in the surrounding areas (Mir et al. 2021).

It is necessary to study the natural compounds of a plant in traditional medicine to gather information about new medicines (Yaniy 2014). Various studies indicate that plants have several biological activities benefiting human health (Pucot et al. 2021). A pharmacological test is employed as a follow-up of an ethnobotanical survey in different local communities and indigenous groups (Amiri et al. 2014; Guzmn-Gutierrez et al. 2022; Schultz et al. 2021). It reaffirms the importance of knowledge of traditional medicine in the new medicine discovery and development processes.

The sustainability of ethnomedicine from the past to the future impacts the economy and ecology (Mondal M et al. 2022) and preserves valuable assets for future generations (Thangliankhup et al. 2022). The local wisdom in using plants as a medicine in community culture needs to be examined and preserved (Dalar et al. 2018). An example of local wisdom on medicinal plants can be found in the Dayak Tribe, native to Central Kalimantan, who still consult with a gatherer of traditional medicine (*Batra*) when they have health issues. *Batra* will then prepare a prescription for medicine made from plants. If this knowledge is not passed on to the next generation, it will be lost. Therefore, this research aimed at collecting ethnomedicine to conserve biodiversity and protect the inherited culture conducted by the Dayak Tribe in Central Kalimantan and plant-based drug independence. The research has a broader scope than the previous research that focused on ethnomedicine in Dayak Jangkang Tribe (Supiandi et al. 2021).

~~Borneo has forests that contain hundreds of plants that have been used by the surrounding communities for thousands of years for treatment, culinary, construction, and others (UNORCID 2014). World Health Organization (WHO) states~~

that the term of ethnomedicine or traditional medicine as knowledge, skills, and practice based on theories, beliefs, and experiences of various cultural habits used in health care, prevention of diseases, and improvement of physical and mental performance and have been used from generation to generation (Choi SH 2008). Information on ethnomedicine on the utilization of plants and ethnobotany is limited (Pereus D et al 2019), likewise the importance of studying ethnomedicine in the treatment practice conducted by Tetun ethnical group in disease prevention and treatment (Taek M.M et al. 2019). The potential of local wisdom in the utilization of plants as a medicine in community culture needs to be examined and preserved (Dalar A et al. 2018). The utilization of ethnomedicine as a basic data for further research and to conserve local medicine (Sukmasari S et al.2019). Herbal medicine or traditional herbs have been developed and promoted by Muslim countries and China (Mojtaba H et al. 2015). The herbs are used as a medicine and to prevent diseases (Yaniv 2014). The sustainability of ethnomedicine from the past to the future has impacts on the economy and ecology (Mondal M et a., 2022) and preserves valuable assets for future generations (Thangliankhup K et al. 2022). Traditional herbs play a significant role in fulfilling the primary health need of communities who live in the surrounding areas (Mir T A et a., 2021).

Knowledge of ethnomedicine of the Dayak Ngaju people originates from plants that are used medically (Luardini MA et al. 2019), such as the continuation of traditional treatment by the tribes in India (Singh S et al. 2022). It is necessary to study the natural compounds of a plant in traditional medicine to gather information about new medicines (Yaniy 2014). Various studies indicate that plants have several biological activities benefiting human health (Pucot et al. 2021). A pharmacological test is employed as a follow-up of an ethnobotanical survey in different local communities and indigenous groups (; Amiri et al. 2014; Guzmn-Gutierrez S L et al. 2022; Schultz et al. 2021), It reaffirms the importance of knowledge of traditional medicine in the new medicine discovery and development processes. Knowledge of traditional medicine that is rich of medico-botanical aspects (Roy M et al. 2022). The Dayak Tribes are native tribes in Central Kalimantan that still consult with a gatherer of traditional medicine (*Batra*) when they have health issues and to maintain health. *Batra* will then prepare a prescription for medicine made from plants. When the traditional herb prescriptions are not passed down or undocumented will result in the loss of knowledge which is the local wisdom that needs to preserve.

The efficacy of the traditional medicines used by *Batra* and local communities makes use of plants and various methods and processes in developing medicine from ethnomedicine. Exploration and inventory of medicinal plants and their local wisdom-based utilization in the community need to be conducted (Mustofa, F.I & Mujahid, R, 2017). Therefore, the research aims at collecting ethnomedicine as an effort to conserve biodiversity and protect the inherited culture conducted by the Dayak Tribe in Central Kalimantan and plant-based drug independence. The research has a broader scope compared to previous research that focused on ethnomedicine in Dayak Jangkang Tribe (Supiandi et al., 2021). Moreover, the research aims to calculate the UVc value of each species collected from interview results and informants of Dayak local people. Mustofa, F. I., & Mujahid, R. 2017.

MATERIALS AND METHODS

Central Kalimantan has 13 regencies and a city. Its geographical location is between 0°45′ North Latitude - 3°30′ South Latitude and 111° - 116° East Longitude. The study was conducted in several regencies in Central Kalimantan, namely, Seruyan District, located at (111° 49’ - 112° 84’ EL, and 0° 77’ - 3° 56’ SL), Katingan District located at (1°14'4,9"-3°11'14,72" SL and 112°39'59"-112°41'47" EL), North Barito District, located at (114° 27’ 00” - 115° 49’ 00” EL and 0° 58’ 30” EL - 1° 26’ 00” SL), Kapuas District, located in (0° 8' 48” - 3° 27' 00” SL and 113° 2' 36” - 114° 44' 00" EL), and Palangka Raya City, located at (113°30'-114°04' EL and 1°30'-2°30' SL). About 45.98% of the population is the Dayak tribe that spreads in almost areas of Central Kalimantan. Central Kalimantan has an area of 153,564 km^2 or 8.04 %~~percent~~ of the total land of Indonesia. The geography of the north part consists of Muller Swachner mountains and hills, whereas the south part comprises low lands, swamps, and smacks. The area has a humid tropical climate and is crossed by the equator. Eighty percent of its area is dominated by forests, primary forests that left 25% of the total area. Sampling was conducted in 4 regencies, namely North Barito, South Barito, Katingan, and Seruyan, and one city, ~~which wasi.e~~, Palangka Raya (Figure 1).

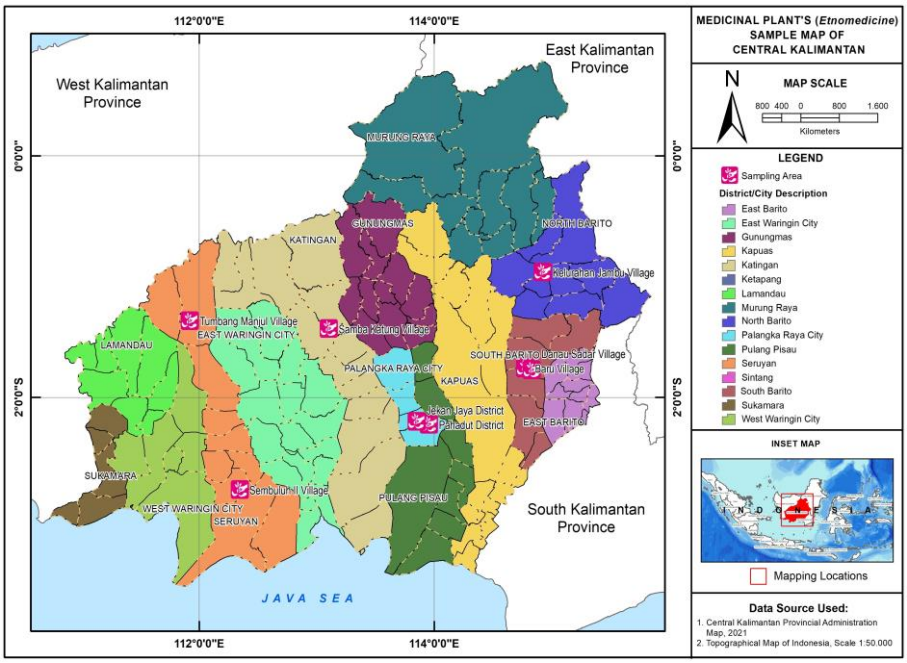

Figure 1. Ethnomedicine exploration research sites in Central Kalimantan, Indonesia

Data collection and sample

The research sampling was carried out from July 2020 to October 2021 by considering health protocols stated by the Intercity/district Task Force for COVID-19 prevention. The ~~selection of~~ informant~~s samples~~ to be interviewed ~~was conducted~~were selected using purposive and snowball approaches. The first step was semi-structured interviews with key informants, namely the local community, to get one or several people who have knowledge or good experience in traditional treatment. The second step ~~after the interviews~~ was asking the informants to recommend other persons to become the next informants. The person chosen to be an informant must meet the following criteria~~:~~; (1) Being Dayak indigenous people; (2) ~~have~~ having experience in the utilization of traditional medicine, namely gatherer or *Batra*, family of *Batra*, patients, or family member of the patient; (3) gain~~ing~~ knowledge of traditional treatment from medical practices by parents or *Batra* at home or in the village; and (4) gain~~ing~~ agreement based on the initial information without coercion and agreement for a semi-structured interview. The third step was a focus group discussion, exploration, and identification of medicinal plants. All data gathered were coded and analyzed using Microsoft Excel Spreadsheet Software. The semi-structured questionnaire was modified and adapted from the ethnobotanical survey of ~~(~~ Kadir~~, A.,~~ et al. ~~(~~2022~~),~~ Alduhisa and Demayo ~~(~~2019~~), ;~~ Widodo~~, H.~~ ~~(~~2019~~), ;~~ Aati~~, H.,~~ et al.~~(~~2019) with modification and translation for the Dayak language (a local language mostly used in the regions). The questionnaires distributed to the informants contained questions about demographic information, i.e., ~~such~~ as name, age, gender, ethnic group/types of Dayak tribe, level of education, civil status, occupation, and religion. Other questions ~~included~~ were the name of local plants used as medicine for certain diseases and the composition of the herbal ingredients used, parts of the plant used, method of concocting, the amount and frequency of administration, and the origin of the herbs utilization by the native people of Dayak Tribe.

Collection and identification of plants

The data collection of plant specimens during the visit was assisted by the informants and local guides. The plant specimens were photographed as a whole and ~~parts were~~the utilized parts. The ~~interview process was~~ recorded ~~in terms of~~ data information were: ~~how the plant is used~~the method of using the plant, the habitat, the area name, and the local name. Based on the field observations, interviews, and discussions with informants, identification of the discovered plant specimen samples was conducted. The researchers, at first, identified samples, and the botanists and taxonomists helped in the identification and final validation. The plants were then validated by checking their spelling, synonym, family classification, and distribution using Plants of the World Online (POWO; www.plantsoftheworldonline.org).

Data analysis

The collected data ~~of the results of observations and field records, interviews, and discussions with the informants~~ were ~~typed neatly and~~ to find out the philosophy of the Dayak ethnic groups in Central Kalimantan and the ethnomedicine practice in preventing and treating disease. Specifically, the data were analyzed to ~~describe: gain data required in the form of~~ (1) local concepts on diseases and the causes, (2) prevention and treatment methods, and (3) types of a plant used for the disease prevention and treatment. ~~The three aspects were analyzed qualitatively regarding the philosophy of the Dayak ethnic groups in Central Kalimantan and the ethnomedicine practice in preventing and treating disease.~~ Further, the local name of each plant was identified along with their scientific name based on the results of specimen identification. The obtained medicinal plants were then calculated for their Use Value Index (UV) to count the plant citations during interviews as suggested by Phillips and Gentry (1993) and adapted by de Albuquerque et al. (2007). The calculation formula is as follows.

$$UVc = \frac{\sum Uis}{ns}$$

Where:
Uvc : the use value of a species
∑Uis : the total number of use citations by all informants for certain species,
ns : total informants (ns)

RESULTS AND DISCUSSION

Knowledge of traditional medicinal plants by Dayak people in Central Kalimantan was gained from the results of interviews with 40 locals in several villages in the four districts and one city. The respondents consisted of more females (55%) than males (45%) and mostly aged 50-65 years old (48%). The level of education of the respondents was a mainly elementary school (52%). The results indicate that women and those less educated are accustomed to using traditional herbs of the Dayak tribe. Other studies on ethnobotany also suggest that women know more about knowledge of traditional herb plants than men (Pucot, J and Demayo, C 2021; Tantengco et al, 2018; Balinado and Chan 2017; and Abe and Ohtani 2013). The lower level of educational achievement, which is elementary school, was prominent (52%) in understanding the traditional herbs. This is in contrast with research by (Tantengco et al, 2018; Abe and Ohtani 2013). The informants were mostly housewives (38%), followed by traditional herbs gatherers of the Dayak tribe/ *Battra* (31%), farmers (24%), and other existing occupations (7%). The profile of the informant characteristics is presented in Table 1.

The majority of the informants acquired knowledge of ethnomedicine from their parents or family, which was 49%, 35% of them received the knowledge through traditional herbs gatherer/*Battra*, and the remaining 16% of them received the knowledge by self-learning. The common method used in consuming traditional medicine was by drinking (88.3%) and applying it (11.7%). Plant ingredients made as the traditional medicine were largely collected from the woods that wildly grew (55%), types of other medicinal plants were taken from the surrounding environment (35%), whereas the other 10% of the plants were collected from the community (Table 2).

Table 1. Characteristics of key informants in Central Kalimantan

Category	Sub-category	Number of informants	% informant
Address	Samba Katung Village, Central Katingan Sub-district, Katingan District	15	36%
	Baru Village, Danau Sadar Village, South Dusun Sub-district, South Barito District	10	24%
	Jambu Village, Teweh Baru Sub-district, North Barito District	5	12%
	Pahandut dan Jekan Raya Sub-districts Palangka Raya City	8	19%
	Tumbang Manjul Village and Sembuluh II Village Seruyan District	4	9%
Education	SMP (junior high school)	20	48%
	SD (elementary school)	22	52%
Gender	Male	19	45%
	Female	23	55%
Age	35-49 years old	14	33%
	50-65 years old	20	48%
	> 65 years old	8	19%
Occupation	Gatherer/Batra	13	31%
	Farmer	10	24%
	Housewife (IRT)	16	38%
	Etc	3	7%

The ingredients of medicinal plants are collected every year (13%), every month (43%), every week (18%), and every day (12%), and taken when needed (12%). Some of them require a specific time in collecting certain medicinal plant ingredients, namely on Friday. Moreover, certain medicinal plants are taken by men only. The collection of certain medicinal plant ingredients is conducted once a week on Friday, which is a recommended day in the Islamic religion and it is also a practice that is conducted by several cultural tribes and other countries (Rebuya et al, 2020 and Napoli 2008). Prior to picking or collecting plants and before consuming the medicine, the patients must say "*Basmallah*" (in the name of God) and after consuming the medicine they convince themselves by saying "*Biidznillah*" (with God's permission) then their diseases can be cured. They believe that God will cure them through the traditional herbs from the surrounding plants. Certain plants could have medicinal effects for several diseases, such as *keratau*, *pulai*, *tawar seribu*, *tabat barito*, *putat*, and so on. The utilization of formulas from several plants still requires an investigation since it is likely that herb interaction could generate antagonist effects or synergy effects (Guardo et al. 2017). The aim is that the use of traditional herbal medicines can be effective on a regular basis and does not coincide with chemical drugs. The followings are samples of documentations when identifying and interviewing the process of gathering traditional medicines in Dayak Bakumpai and Dayak Ngaku tribes in Central Kalimantan as indicated in Figure 2 and 3.

A total of 60 types of plant are found in the research that are useful for traditional medicine. The plants spread in the family of Fabaceae and Lauraceae (each 5 species), Myrtaceae, Rubinaceae, Zingiberaceae, and Menispermae (3 species each), Vitaceae, Acanthaceae, Meliaceae, Euphorbiaceae, Arecaceae, Verbenaceae, Dipterocarpaceae, and Moraceae (2 species each), Apocynaceae, Malvaceae, Asparagaceae, Marattiaceae, Blechnaceae, Passifloraceae, Crassulaceae, Poaceae, Oxalidaceae, Dilleniaceae, Rutaceae, Lecythdaceae, Saltalaceae, Annonaceae, Cucurbitaceae, Piperaceae, Labiataceae, Asteraceae, Lamiaceae, Liliaceae, Thymelaeaceae dan Simaroubaceae (1 species each). The traditional medicinal plants are mostly in the family of Fabaceae and Lauraceae, which is 8% each (5 species). Overall, the plant family used for the traditional medicines in Central Kalimantan is presented in Figure 3.

Figure 2 shows that plant families mostly utilized by the Dayak Bakumpai and Dayak Ngaju tribes include Fabaceae and Lauraceae with a percentage of 8%. This is followed by Myrtaceae, Zingiberaceae, Rubiaceae, and Menispermaceae with a percentage of 5% each, and the remaining family is in the percentage of 5%. According to Asfaw & Abebe (2021), the Fabaceae family is used for traditional medicine in Ethiopia for snakebites (25 species), the evil eye (19 species), and wounds (18 species) in various regions of the country. The research result (Kalima, T & Denny, D, 2019) indicated 2,253 individuals in 99 species, 77 genera, and 42 families. Families that have the most number are Myrtaceae, Euphorbiaceae, Sapotaceae, Dipterocarpaceae, and Lauraceae. The Fabaceae family in the interior of Borneo is used as external medicine (tinea versicolor) and internal medicine (diabetes). The utilization of Fabaceae is by using its vegetative and generative organs by pounding or boiling them. *Bajakah* plant is one of the plants from the Fabaceae family that went viral in 2019 since it is believed by the Borneo people as an anti-cancer. Researchers from Brazil state that Fabaceae is one of the largest families that has an ethnopharmacological importance for humans and livestock (Macêdo et al., 2018). Likewise, the Lauraceae family is a potential source for a chemopreventive agent that targets the Nrf2/ARE pathway (Shen et al., 2014). This family is interesting due to the cytotoxic and neuroactive alkaloids it produced (Wiart, 2006). Further study must identify plants that can be selected for their pharmacological effects and chemical compositions (Andrade-Cetto & Heinrich, 2011).

Table 2. Traditional medicine used by the gatherer/*Batra* and local people

Scientific name	Family	Local name	Disease treatment	Parts of the plant used	Preparation and administration	~~Amount or d~~Dose	Frequency/duration
Peronema canescens Jack	Verbeaceae	*Sungkai sayur*	Diabetes	Rt	Boil the *sungkai sayur* roots with enough water about a quarter liter for 1 small root	One cup	Drink once a day
Curcuma aeruginosa Roxb	Zingiberaceae	*Henda babilem/ temu hitam*	To heal sore and diabetes	Rz	Dry the tuber and then mash and mix with hot water	Drink 1 cup	Drink twice a day until the pain subsides
Eleutherine bulbosa	Liliaceae	*Bawang tiwai*	Anti-cancer, diabetes	Rz	Take parts of the plant tuber and boil with water	Drink 1 cup of the boiled water	Once a day until the symptoms subside
Euphorbia tirucalli Linn	Euphorbiaceae	*Kayu patah tulang*	Painful bone disease and skin diseases such as warts	St, Rt	The roots and stems are sun-dried and boiled	Drink 1 cup of the boiled water	Twice a day until the sugar level drops
Eurycoma longifolia Jack	Simaroubaceae	*Pasak bumi*	Anti-malaria, anti-cancer, anti-leukemia, increase body immune	Rt	The roots can be boiled or brewed with hot water then drink	Drink 1 cup of the boiled water	Twice a day until the sugar level drops
Uncaria gambir Roxb	Fabaceae	*Bajakah kalalawit*	Diabetes	Rt, St	Boil and drink the boiled water.	Drink 1 cup of the boiled water	Twice a day
Vitex pinnata L	Lamiaceae	*Kayu Halaban*	Malaria, diabetes, maintain stamina	Lf, Rt	Take 5 leaves and boil. The root parts are grated into powder and then boiled for 15 minutes and cooled	Drink 1 cup of the boiled water	Twice a day in the morning and at night
Rhodomyrtus tomentosa	Myrtaceae	*Karamunting*	Diabetes, malaria, sharp object injuries	Lf	Wash leaves and fruits, dry them and grind them into powder. Brew the powder with water like brewing coffee.	Boil the leaf powder and drink	Twice a day in the morning and at night
Eusideroxylon zwageri	Lauraceae	*Kayu Tabalien*	Diabetic wound	Brk, Se	The bark or seeds are ground into powder	The powder is brewed with water or applied to the wound of diabetic people.	Drink in the morning and afternoon and apply to the wound every 6 hours
Syzygium myrtifolium	Myrtaceae	*Patindis*	Eye pain and diabetes	Lf, Rt	- For eye pain: young leaves of *Patindis* are boiled and put in a container. We open our eyes in the water after it is cold -for diabetes, patindis *roots* are dried and then boiled and drink the boiled water	- for the eye: use it when eyes are a bit blurry/not clear -for diabetes: and drink it until the sugar level drops	-for the eye - use as needed - for diabetes, root stew is taken twice a day
Pternandra rostrata	Lauraceae	*Kayu Kamasulan*	Diabetes	St	Stems are cut into small pieces, washed, and boiled	Drink the boiled water	Drink 2 or 3 times a day routinely.
Smallanthus sonchifolius	Asteraceae	*Insulin*	Diabetes	Lf	Insulin leaves are boiled and drink the boiled water	Drink until healed	Drink the boiled water one cup twice a day
Orthosiphon stamineus Benth.	Labiataceae	*Bawi Hatue*	Diabetes	Rt, Lf	Wash 7 leaves and 1 root segment and boil them with enough water	Usually, blood sugar returns to normal in 4 days, drink until the sugar level is normal	Drink one cup of the boiled water twice a day

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Ampelocissus rubiginosa L	Vitaceae	*Tawas Ut*	Liver disease, poison neutralizer, diabetes	Rz	Root tubers are cut 3-5 cm and boiled with water	Drink the boiled water	Drink routinely three times a day
Alpinia golonga Willd.	Zingiberaceae	*Lemas*	Diabetes, skin diseases, such as tinea versicolor	Rz	Root tubers are cut 3-5 cm and boiled with water	Drink the boiled water and rub the root tubers	Drink routinely three times a day and for skin diseases, rub the tubers three times a day
Andrographis paniculata (Burm.f.) Wall ex Nees	Acanthaceae	*Sambiloto*	Diabetes	Lf	7 leaves are washed and boiled	Drink the boiled water	Drink three times a day after meals
Tinospora crispa Miers	Menispermaceae	*Penawar gantung*	Diabetes, rheumatic, itching, sores	Brk, Lf	Barks and leaves are ground and then boiled or brewed with hot water	One cup a day	Can be drunk once a day until healed or poured on the itchy parts
Piper cronatum	Piperaceae	*Sirih bahandang*	Diabetes, to heal wounds and prevent infections	Lf	-young betel can be consumed immediately if the person is strong. If not, he/she could drink the boiled water of the young betel	1 cup	Drink twice a day
Shorea smithiana	Dipterocarpaceae	*Mahambung*	Diabetes	Lf	Take the tip of *mahambung* leaves, boil them and drink the water	Drink the boiled water	One cup twice a day
Momordica charantia	Cucurbitaceae	*Pare*	Diabetes	Pdt	Bitter melon is swashed and cut and then blended with a cup of water. Drink the water	Drink the fruit juice	One cup, twice a day
Tinospora crispa	Menispermaceae	*Penawar Sampai*	Diabetes	Pt, St	Leaves and stems are dried and washed. Boil them with water.	Drink the boiled water	Regularly for 2 or 3 times a day
Cinnamomum burmanni	Lauraceae	*Kayu Manis*	Diabetes	Brk	Soak the bark (3 cm) in a cup of water and leave it overnight	Drink the water	In the morning before meals
Baccaurea lanceolata (Miq.) Muell.Arg	Euphorbiaceae	*Limpasu*	Diabetes and stomachache	Rt, Lf	Boil the roots and drink the water to reduce blood sugar and drink the leaf stew to cure stomachache	Drink the boiled water	Drink one cup in the morning and the evening
Cananga adorata	Annonaceae	*Kenanga*	Diabetes, antidote to animal bites	Brk	The barks are dried and then washed, and boiled with water	Drink the boiled water	Drink after every meal
Aquilaria malaccensis	Thymelaeaceae	*Garu*	Diabetes	St	The stems are made into powder and then brewed or boiled with water	The stem powder is brewed/boiled	Taken regularly 2 or 3 times a day
Arcangelisia flava	Menispermaceae	*Akar Kuning*	Diabetes, jaundice	Rt, Lf	Roots and leaves are ground into powder	Powdered roots and leaves are brewed with hot water until it changes color. Filter the water	Drink the brewed water regularly 2 or 3 times a day
Santalum album L.	Saltalaceae	*Kayu cendanamerah*	Cure diabetic wounds, cholesterol	Brk	Barks are ground into powder and brewed with hot water until it changes color. Filter the water	Drink one cup of the brewed water	Drink the brewed water regularly 2 or 3 times a day
Spatholobus littoralis	Fabaceae	*Akar Mohor*	Diabetes	Rt	Roots are dried, chopped, and mashed by pounding or with a blender. The root powder is then brewed or boiled	Drink one cup of the boiled water	Regularly 2 or 3 times a day.

Morinda citrifolia L.	Rubiaceae	*Mengkudu*	Hypertension, diabetes	Pdt, Brk	Fruits and barks are cleaned, boiled, and let stand until cold. Once cold, filter the water and put it in the bottle and ready to be enjoyed warm; or yellowish fruits are mashed, squeezed, and filtered to get the water to drink.	Drink one cup of the boiled water	Drink 3 times a day
Myrmecodia pendens	Rubiaceae	*Sarang semut*	Cancer and tumor	Rz	The tubers are sliced crosswise and made into powder. Brew the powder with hot water	Drink one cup of the powder boiled/ brewed water	Regularly 2 to 3 times a day.
Swietenia macrophylla	Meliaceae	*Mahoni*	Diabetes	Pdt	The fruits are dried and ground into powder. Brew the powder with warm water	Drink one cup of the boiled/brewed water	Consume regularly 2 to 3 times a day
Litsea angulate	Lauraceae	*Kalangkala*	Hemorrhoid	Rt, St	Roots and stems are grated and then roasted. Further, the roasted roots and stems are mashed and mixed with a little cooking oil then apply it on the hemorrhoid part. Roots and stems are boiled and drink the boiled water.	11 pieces of root and stem in a size of 5cm for 5 cups of water	Drink one cup twice a day in the morning and the evening
Areca catechu	Arecaceae	*Pinang*	Diabetes	Rt	Roots are dried and then mashed and brewed with hot water like making a coffee	The root powder is brewed with hot water	Drink one cup in the morning and the evening
Nauclea orientalis	Rubiaceae	*Pohon taya*	Black spots on face	Lf	Mashed the leaves and peel the inside part of the bark and then mix them. Apply them to the face.	Do it at noon or in the middle of the day as a cold powder	Use enough leaves and bark for 1-time application
Angiopteris avecta	Marattiaceae	*Umbi hati tanah*	Cancer, tumor, and other internal diseases	Rz	The rhizome powder is brewed with water or boiled	Drink the water	Twice a day
Cocos nucifera	Arecaceae	*Enyuh*	Diabetes	Rt	Pound the dried roots and boiled	Drink the water	Drink twice a day in the morning and the evening
Planchonia valida BI.	Lecythdaceae	*Putat*	Bronchitis, gingivitis, to control stomach acid level, diabetes	Lf	The tops of the leaves are washed and consumed immediately or dry the leaves and then brew with hot water like making a tea	Drink the brewed water or directly consume the leaves	Drink 3 times a day
Dipterocarpus haseltii	Dipterocarpaceae	*Sangeh*	Diabetes,	Rt, Brk	Roots and bark are taken and then washed and dried. Boil the potion when using it	Boil the dried roots and bark	Drink the boiled water 3 times a day
Aglaia elliptica (C.DC) Blume	Meliaceae	*Mata-mata*	Tumor, cancer	Lf, Brk	Bark stew can be used traditionally to cure tumors, whereas, leaves can be used as medicine for wound and cancer prevention.	Drink one cup of the boiled water	In the morning and the evening
Luvunga eleutheandra Dalz.	Rutaceae	*Seluang belum*	Maintain stamina	St	Soak with water. Both husband and wife should drink the potion to be more nutritious	Drink the soaked water	1 cup of water in the morning and the evening
Ficus deltoidea Jack	Moraceae	*Tabat Barito*	Diabetes, diarrhea, cough with phlegm, tumor	Lf, Rt	Wash roots and leaves and boil them for 3-4 minutes	Filter the boiled water and drink it	Drink 3 times a day
Tetracea sp.	Dilleniaceae	*Hampelas bajang*	Cure scratches/cuts	Lf	Young leaves are kneaded by hand and add a little water	Apply to the wound	Apply 3 times a day
Bauhinia sp.	Fabaceae	*Cawat anuman*	Smooth the birth process	Lf, Rt	Fresh leaves and roots are crushed and shaped into rounds	Swallow the round shape of the crushed fresh leaves and roots	Drink it in the morning and the evening

Strobilanthes crispus BI	Acanthaceae	*Keci beling*	Back pain due to wrong sitting or a lot of activity	Rt	Roots are cleaned and soaked in the water in the bottle for 24 jam	Drink the root soaking water	1 cup a day
Averhoa bilimbi L	Oxalidaceae	*Belimbng tunjuk*	Reduce blood pressure	Pdt	1-2 fruits are cut and boiled in boiling water for a minute and filtered	Drink the water	Drink 3 times a day after meals
Cayratia sp.	Vitaceae	*Gamat*	Heal cuts and scratches	Lf	Take the leaves and crushed them by hand	Apply it to the wound	Apply it to the wound as often as possible
Cymbopogon nardus L. Rendle	Poaceae	*Serai*	Stomachache	St	Stems are pounded and boiled in boiling water 2-3 minutes	Drink when you have a stomachache	Drink 1 cup every time you have a stomachache
Kalanchoe blossfeldiana	Crassulaceae	*Cocor bebek*	Heals scratches/falls/ sharp object cuts	Lf	Grind young leaves until smooth	Apply it to the wound	Apply it to the wound 2 to 3 times a day
Senna alata (L.) Roxb.	Fabaceae	*Gulinggang*	Tinea versicolor, relieve inflammation, anti-diabetes	Lf,	Leaves are pounded and applied them on skin that have tinea versicolor or experiences inflammation. Boil the leaves and drink the boiled water	Apply on sore or inflamed skin	Drink 1 cup of the boiled water 3 times a day
Morus alba L.	Moraceae	*Keratau*	To smooth breast milk, diabetes, hypertension, rheumatism	Lf	Boil 1 handful of fresh leaves	Drink the boiled water	1 cup in the morning and the evening
Passiflora foetida L.	Passifloraceae	*Keleng kemot*	Diabetes	Wh	Wash and boil with water	Drink the water	1 cup in the morning and the evening
Stenochloena palustris (burm.F.) Bedd.	Blechnaceae	*Paku haruan*	Medicine for male stamina	Rt	Soak roots or boil with water	Drink the boiled or soaked water	1 cup in the morning and the evening
Cordyline fruticosa	Asparagaceae	*Andang hijau/ sawang*	Lung diseases	Brk	Separate the skin from the stem about 50 cm. Scrape the inside part of the skin using a tablespoon, add 100ml of water and mix well and then filter.	Drink the water and the dregs are smeared on the chest	Do it regularly 2 times a day until the lungs condition improves.
Hibiscus rosa sinensis	Malvaceae	*Kembang sepatu*	Reducing fever due to flu	Lf	Young leaves are soaked with warm water for 4-5 minutes	Rub all over the body	Do it 3 times a day
Curcuma domestica	Zingiberaceae	*Janar*	Fever, cough, prolonged flu	Rz	Grind 1-2 rhizome fruits until smooth and mix it with wet lime and stirred until mixed	Do it 3 times a day	Rub evenly
Psidium guajava L	Myrtaceae	*Jambu biji*	Diarrhea	Lf	2-3 young leaves are pounded	Consume and rub	Do it 3 times a day
Eusideroxylon zwogeri Teijs. et Binn.	Lauraceae	*Ulin*	Kidney, to blacken hair and prevent gray hair	Lf, Pdt	Leaves are pounded. Take the inside part of the fruits and mix them with coconut oil	Kidney: smeared on the stomach and smeared on hair	Do it 3 times a day
*Alstonia iwahigensis*Elmer	Apocynaceae	*Pulai*	Diabetes, hypertension, malaria	Brk	3-4 grams of barks are boiled with 3 cups of water until 2 cups remain and then filtered	1 cup	Drink in the morning and the evening
Vitex tripolia	Verbenaceae	*Gundi*	Diabetic wound	Lf	Leaves are boiled	Leaf boiled water	Wash the wounds in the morning and the evening
Bouhinia purpurea	Fabaceae	*Tawar seribu*	Hypertension, diabetes, cholesterol	Rt	Boil the roots	Drink the boiled water	Drink 3 times a day

Note: Parts of plant used: Brk: bark; Pdt: fruit; Lf: leaf; Pt: petiole; Rt: root; Rz; rhizome; Se: seed; Sh: shoot; Sp: sap; St: stem; Wh: whole plant: I: internal; E: external

Figure 2. Samples of Identification Traditional Medicine of Dayak Bakumpai and Dayak Ngaju Tribes, Central Kalimantan, Indonesia

Figure 3. Samples of Traditional Medicine Gathering of Dayak Bakumpai and Dayak Ngaju Tribes, Central Kalimantan, Indonesia

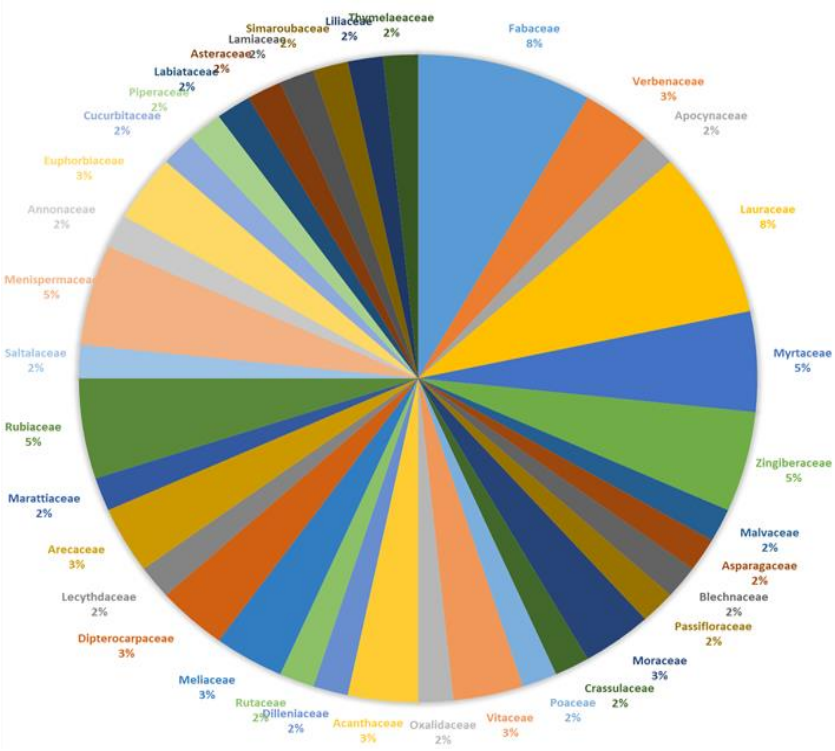

Figure 3. Plant families used as traditional medicines in Central Kalimantan, Indonesia

Table 3. Use value of traditional medicinal plant species of Dayak Bakumpai and Dayak Ngaju Tribes in Central Kalimantan, Indonesia

No	Species	Number of species	Percentage	Uvs
1	*Perenema canescens, Uncaria gambir roxb, Eusideroxylon zwageri, Pternandra rostrata, Smallanthus sonchifolius, Orthosiphon spicatus, Andrographis paniculata* (Burm.f.) *Wall ex Nees, Shorea smithiana, Momordica charantia, Tinospora crispa, Cinnamomum burmannii, Aquilaria malaccensis, Spatholobus littoralis, Swietenia macrophylla Litsea angulate, Areca catechu, Nauclea orientalis, Cocos nucifera, Dipterocarpus haseltii, Luvunga eleutherandra* Dalz., *Tetracea* sp., *Bauhinia* sp., *Strobilanthes crispus* Bl., *Averrhoa bilimbi* L.,*Cayratia sp., Cymbopogon nardus* L. Rendle., *Kalanchoe blossfeldiana, Passiflora foetida L., Stenochloena palustris* (burm.F.) Bedd., *Cordyline fruticosa, Hibiscus rosa sinensis, Psidium guajava* L., *and Vitex tripolia*	33	55%	0.02
2	*Curcuma aeruginosa* Rxb, *Eleutherine bulbosa, Euphorbia tirucalli Linn, Syzygium myrtifolium, Alpinia golonga Willd., Baccaurea lanceolata (Miq.)Muell.*Arg., *Cananga adorata, Arcangelisia flava., Morinda citrifolia* L., *Myrmecodia pendens., and Aglaia elliptica* (C.DC) Blume	11	18.33%	0.05
3	*Vitex pinnata* L, *Rhodomyrtus tomentosa, Ampelocissus, rubiginosa* L, *Piper cronatum, Santalum album* L., *Angiopteris avecta, Senna alata* (L.) Roxb., *Curcuma domestica, Eusideroxylon zwogeri* Teijs. et Binn., *Alstonia iwahigensis* Elmer, and *Bouhinia purpurea*	11	18.33%	0.07
4	*Eurycoma longifolia* Jack., *Tinospora crispa* Miers., *Planchonia valida* Bl., Ficus deltoidea Jack., and Morus alba L.	5	8.33%	0.10

The current research also reports the UVc values to find out the use value of each species in Central Kalimantan. The method evaluates the relative interest of each medicinal plant species based on its relative utilization among the informants. The index is useful to analyze the utilization of a species and compare plants between the same samples. Following the use value of medicinal plant species of Dayak Bakumpai and Dayak Ngaju tribes in Central Kalimantan.

Table 3 indicates that only 8.33% of the plants have a UVc value of 0.10. The plants are *Eurycoma longifolia*, *Tinospora crispa*, *Planchonia valida*, *Ficus deltoidea*, and *Morus alba*. Dayak people utilize these plants as anti-malaria. The research results suggest that *tongkat ali* (Eurycoma sp.) has anaphrodisiac effect and intermittent fever (malaria) in Asia (Rehman et al., 2016). Eurycoma plant has a local name of *pasak bumi*, whereas in Malaysia it is known as *Tongkat Ali*. Next is *Brotowali* plant which is easy to live in the tropics, including in Borneo (Malik, 2015). *Brotowali* (*Tinospora crispa*) is utilized as a drug for diabetes by the Dayak people. Ahmad *et al*. (2016) state that the plant has pharmacological activities as anti-diabetes since it contains alkaloids, flavonoids, flavone glycosides, triterpenes, diterpenes, and diterpene glycosides, cis clerodane-type furanoditerpenoids, lactones, sterols, lignans, and nucleosides. *Daun putat* (*Planchonia*) has benefits to treat Bronchitis, gingivitis, controlling stomach acid levels, and diabetes. Hasibuan (2018) explains that *daun putat* contains phenolic compounds of gallic acid type. *Ficus deltoidea* (*tabat barito*) is useful for diabetes, diarrhea, cough with phlegm, and tumor diseases. According to Rosnah *et al*. (2015), *selayar* or *tabat barito* is a native plant from Malaysia that plays a role as the main source of anti-oxidant. Lastly, *Keratau* (*Morus alba*) is believed by the Dayak Tribe to smooth breast milk, diabetes, hypertension, and rheumatism. Parts used from the plant aret the leaf organs. The substantial number of the plants used by the Dayak Bakumpai and Dayak Ngaju tribes is a finding that can be a foundation for developing laboratory-based modern medicinal plants. Years of empirical practice have been conducted by inland Dayak tribes in performing self-medication efforts to stay survive. The gatherers and *Batra* in Borneo play a significant role in preserving local plants for conservation purposes and maintaining body health.

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