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Ethnobotany of sacred plants and agricultural rituals among the Kanayatn Dayak in Ambawang Village, West Kalimantan, Indonesia

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Abstract. *Hasanah SU, Syamswisna, Candramila W. 2025. Ethnobotany of sacred plants and agricultural rituals among the Kanayatn Dayak in Ambawang Village, West Kalimantan, Indonesia. Biodiversitas 26: 2882-2894.* The Dayak Kanayatn people in West Kalimantan, Indonesia, uphold their customs, reflecting their dependence on nature through traditional ceremonies that utilize plants, which are vital for their cultural and heritage conservation. These rituals not only have social value but also aid in biodiversity conservation through locally inherited wisdom. This research documents the use of plants in Bahuma, the traditional agricultural rituals of the Dayak Kanayatn community, conducted in Ambawang Village, Kubu Sub-district, Kubu Raya District, West Kalimantan, to support the preservation of their traditions and ethnobotanical knowledge. The study took place from March to July 2023 across four hamlets (Tanah Kuning, Parit Sembilan, Kuala Ambawang, and Medan Sri). The study employed surveys, field observations, semi-structured interviews with key informants, and documentation of plant specimens used in ceremonies. Data analysis qualitatively categorized agricultural rituals and their associated plants, organizing the information by name, classification, parts utilized, significance in rituals, and collection locations. The community preserves the *Adat Bahuma* agricultural ritual, comprising six key ceremonies related to rice planting and involving 24 plant species, primarily from the Araceae and Poaceae families. While reflecting their spiritual connection to rice cultivation and reliance on local plants, the Dayak Kanayatn community faces challenges in conserving declining species crucial to their cultural practices.

Keywords: Agricultural traditional rituals, Bahuma tradition, Dayak Kanayatn, ethnobotany

INTRODUCTION

The Kanayatn Dayak, a sub-ethnic group within the Dayak population in West Kalimantan Province, Indonesia, is characterized by its strong adherence to traditional customs, which are deeply integrated into their daily lives (Beno et al. 2022). This community relies heavily on natural resources, which reflects a complex cultural heritage where biological resources play a significant role in various ceremonial practices and cultural expressions (Herianto et al. 2018). The Dayak people, including the Kanayatn, are part of the rich cultural diversity of West Kalimantan and possess an extensive ethnobotanical knowledge system that is deeply ingrained in their way of life, as suggested by various studies (Herianto et al. 2018; Qamariah et al. 2020; Utami et al. 2023).

Ethnobotany plays a crucial role in conserving biodiversity and preserving local knowledge and traditions, which are passed down across generations. This field not only improves well-being by integrating traditional knowledge with practical applications but also reinforces cultural identity, particularly through traditional ceremonies (Gaoue et al. 2017; Khatib et al. 2021). Furthermore, the collection and utilization of wild plants are significant cultural practices in many communities. These activities contribute to cultural identity and continuity, highlighting the role of ethnobotany (Marouf et al. 2015; Vandebroek and Albuquerque 2024). Ethnobotanical studies are essential for plant conservation efforts and provide key insights into the interdependent relationship between biodiversity and cultural practices (Sõukand et al. 2024).

Ethnobotanical research on the Dayak Kanayatn community has primarily focused on medicinal plants (Haziki and Syamswisna 2021; Syamswisna and Sepsamli 2022; Patiola et al. 2023), food plants (Candramila et al. 2018; Supiandi et al. 2019a; Ege et al. 2022; Wulandari et al. 2024), natural cosmetic plants (Sari et al. 2024), and traditional clothing used in ritual ceremonies (Roberto et al. 2020). However, studies on plant use in traditional rituals among the Dayak Kanayatn remain limited (Dirgari et al. 2022; Musmuliadi et al. 2022), especially given their widespread presence in West Kalimantan. The Dayak Kanayatn primarily inhabit the districts of Landak, Bengkayang, and Mempawah. One ethnobotanical study on their traditional rituals was conducted by Musmuliadi et al. (2022) in Nyayum Village, Kuala Behe Sub-district, Landak District, identifying the use of 26 plant species from 19 families across 12 traditional rituals. The twelve traditional rituals can be classified into three groups based on the function of plant use: life cycle rituals such as the *penarang kampong*, traditional healing rituals such as the *baremah malam*, and agricultural rituals practiced by shifting cultivators such as the *naik dango*. Given the ethnic group's wide-spread distribution, further ethnobotanical research may uncover unique findings, particularly concerning plant use in traditional rituals

across various local contexts. Furthermore, traditional ceremonies not only serve social functions but also reflect human adaptation to the environment. Chaachouay and Zidane (2022) emphasize that traditional ceremonies shape societal perceptions of natural resource use, particularly regarding culturally significant plants. These ceremonies frequently involve natural elements from the local environment, particularly plants. Athar and Bokhari (2006) stress that comprehending human-plant relationships is fundamental to conservation efforts.

In Ambawang Village, Kubu Sub-district, Kubu Raya District, the Kanayatn Dayak community preserves traditional customs to safeguard and pass down plant-use knowledge to future generations. Among their traditional agricultural ceremonies, *Adat Bahuma* (agricultural ceremony) stands out as a key practice embodying local wisdom. Led by a *penyangahatn* (priest), *Adat Bahuma* serves as a medium for prayers, expressions of gratitude, and requests to *Jubata*, the supreme deity in their belief system, throughout the farming process, from initial planting to the rice harvest. This series of rituals includes *nabo'panyugu babatak ngawaha' ka uma* (beginning the farming activity), *ngeliliratn penyakit padi* (protecting the rice), *baremah matah tandan padi* (rice harvest), *bapuar* (thanksgiving for new rice), *naik dango'* (new rice year celebration), and *balala'* (observing prohibitions).

There were several studies which discussed agricultural rituals as discussed by Musmuliadi et al. (2022), who describe similar ritual components with variations in nomenclature. For instance, *baremah pamobok* refers to a ritual performed at the initiation of land clearing, intended to seek protection from Jubata (the deity) for the landowner, while *baremah nabut* is a ritual aimed at safeguarding rice crops from potential harvest failure. The *Adat Bahuma* (traditional farming practices) of the inland Dayak communities in mountainous regions reflects another unique aspect of cultural variation. Other studies showcased agricultural rituals by the Dayak Meratus people of the Meratus Mountains in South Kalimantan who practiced seven distinct stages in the farming process, each accompanied by traditional ceremonies (Soehadha 2018; Hadiwijoyo et al. 2017; Efendi et al. 2020; Hendra and Marseda 2022; Sidauruk et al. 2022). There are some interesting facts including that the rice varieties used by the Dayak Meratus are local strains with a growing period of approximately 6 months, differ with most common modern varieties used nowadays which take around four months.

Given the significance of these traditions, ethnobotanical documentation is crucial to ensure their continuity in the face of modernization. Therefore, this research aims to explore and document plant uses by the Kanayatn Dayak in the *Bahuma* agricultural rituals, thereby enhancing the understanding and preservation of their local wisdom. Preserving and managing the Kanayatn Dayak community's traditional knowledge, especially regarding plant use in ceremonial practices, not only enhances cultural appreciation but also raises awareness of biodiversity conservation and cultural heritage.

MATERIALS AND METHODS

Study period and area

This study was conducted from March to July 2023 in Ambawang Village, Kubu Sub-district, Kubu Raya District, West Kalimantan Province, Indonesia. Data collection took place across all hamlets in Ambawang Village, namely Tanah Kuning, Parit Sembilan, Kuala Ambawang, and Medan Sri (Figure 1).

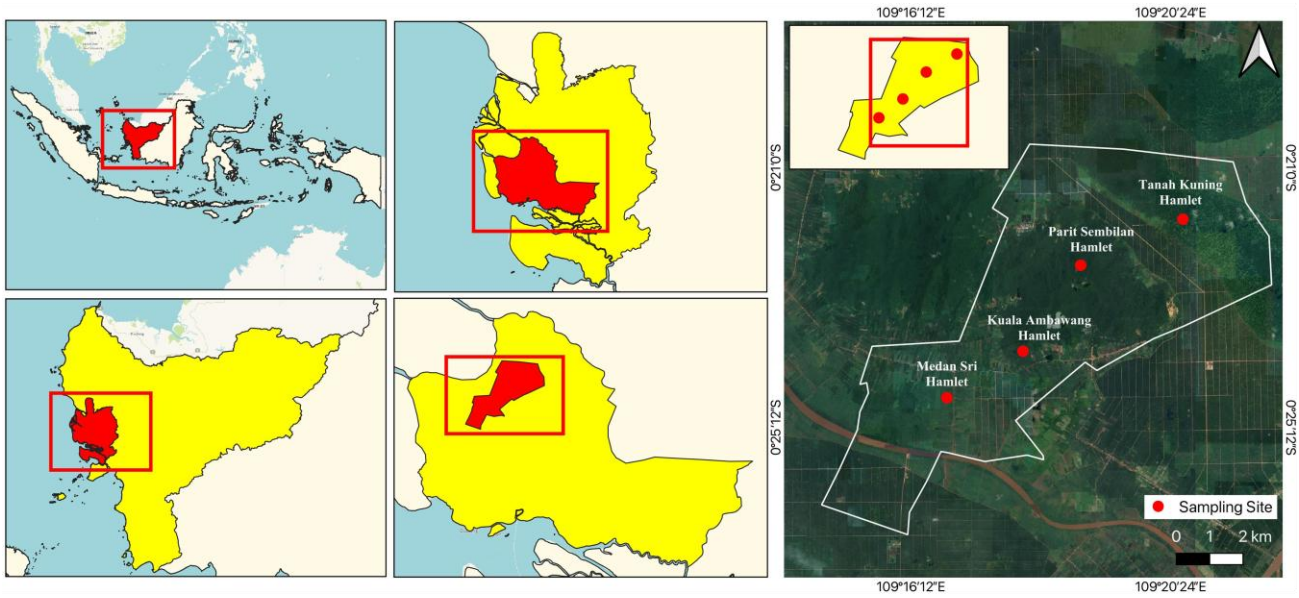

Figure 1. The location of Ambawang Village and sampling area of four hamlets (colored dots), in Kubu Sub-district, Kubu Raya District, West Kalimantan Province, Indonesia

The research employed a survey method with triangulation techniques, including observation, interviews, and documentation. The observation technique was used for field surveys on the plants utilized in agricultural ceremonies, while interviews were conducted to selected informants to gather information on the types, uses, and cultural significance of plants in agricultural rituals. Documentation was employed to record all observations and interviews, as well as to collect plant specimens for herbarium preparation, identification, and data analysis. Plant identification was conducted using a botanical key and validated by a taxonomic expert to ensure the authenticity of the documented specimens.

Interview and observation procedures

The research procedure comprised two stages: preparation and data collection. The preparation stage included gathering tools and materials, obtaining permits, and developing research instruments. The tools included a logbook, writing utensils, knives, scissors, plastic bags, collection bags, *sasag* (herbarium press), tape, cardboard, spray bottles, label paper, adhesive tape, cardboard boxes, and a digital camera. The materials comprised collected plant specimens and 70% alcohol. Research permits were obtained from the Head of Ambawang Village, Kubu Raya District. The research instruments included an interview guide and an observation sheet. The interview guide contained questions regarding the names of agricultural rituals, plant species used in each ritual, their local names, and their methods of acquisition, utilization, and significance in each ritual. The observation sheet recorded the plant locations, their habitus types, and whether they were cultivated or wild.

The data collection stage included determining informants, interviewing the informants, collecting plant specimens, and identifying the plants. The selection of informants was conducted using the snowball sampling technique, beginning with the identification of key informants for initial interviews, followed by additional informants based on recommendations from previous interviewees as described by Shalas et al. (2021). The determination of informant numbers follows Cresswell (2014), who states that the number is sufficient when no new information emerges from the subsequent interviews. Seven key informants were selected, including the village head (1 person), the customary leader or chief (1 person), the ritual leader (*penyangahat* or *imam*) (1 person), and the heads of hamlets (4 people).

The interviews with informants were conducted using a semi-structured technique, which followed a set of pre-formulated questions while allowing for additional inquiries as necessary. For instance, if the plant in question was not found in the surrounding environment (such as forests, gardens, or yards), its source of acquisition was traced. If the plant was obtained through purchase, further investigation examined whether its essence or cultural significance had changed.

The collection of specimens involved collecting all vegetative and generative parts of the plant, including roots, stems, leaves, and fruits. The collected plant specimens included essential components for the identification process. Plant characteristics were recorded in a logbook, assigned a sample number, and placed in labeled plastic bags. All collected specimens were then processed into herbarium samples to aid identification.

Plant identification was carried out at the Biology Education Laboratory, Faculty of Teacher Training and Education, and rechecked by an expert at the Biology Laboratory, Faculty of Mathematics and Natural Sciences, Universitas Tanjungpura, Indonesia. The morphological characteristics of each plant were examined to classify them at the family level, referencing van Steenis (2003). Further identification was conducted to determine the species name and confirm its classification using relevant articles and research findings. Additionally, the identification was verified using several online databases, including http://www.theplantlist.org, http://thenaturalist.org, http://plantamor.com, and https://plants.usda.gov.

Data analysis

The data were analyzed qualitatively using descriptive and tabular methods. In the initial stage, various types of agricultural rituals were meticulously described, encompassing their timing, location, significance, the leaders and participants, and the tools used. Subsequently, the plant species used in each agricultural ritual were categorized. Each identified species was systematically tabulated in a comprehensive table, including its name, scientific classification, specific parts utilized, associated rituals, cultural significance, and the geographic locations where the specimens were collected.

RESULTS AND DISCUSSION

Agricultural rituals of the Kanayatn Dayak community in Ambawang Village

The agricultural rituals practiced by the Kanayatn Dayak community in Ambawang Village, Kubu Raya District (Table 1), consist of six distinct types (Figure 2). These agricultural rituals are collectively referred to as *Adat Bahuma* by the community. *Adat Bahuma* begins with *nabo'panyugu babatak ngawaha' ka uma*, which signifies the commencement of farming activities. This is followed by *ngeliliratn penyakit padi* (protecting the rice from pests and diseases), *baremah matah tandan padi* (harvesting the rice), and *bapuar* (thanksgiving for the new rice). Subsequently, the Kanayatn Dayak community conducts the ritual of *naik dango'*, celebrating the new rice year, followed by *balala'*, a period of abstinence. These agricultural rituals are specifically performed for rice cultivation. According to all informants, the rice cultivated is primarily intended for family consumption. Additionally, rice produced by a family is prohibited from being sold although it may be exchanged with rice from another family through barter. This practice stems from the Kanayatn Dayak belief that rice is a blessing from *Jubata* (God) that should be appreciated. Rice is also considered a vital source of life.

Figure 2. Six activities in the *Adat Bahuma* agricultural rituals by the Dayak Kanayatn community in Ambawang Village, Kubu Raya District, West Kalimantan Province, Indonesia. A. Protection of rice from pests and diseases (*Ngeliliratn Penyakit Padi*), B. New rice Thanksgiving ceremony (*Bapuar*), C. Rice harvest ceremony (*Baremah Matah Tandan Padi*), D. Commencement of farming activities (*Nabo' Panyugu Babatak Ngawaha' ka Uma*), E. Ritual of abstinence (*Bepantang* or *Balala'*), F. New rice year celebration (*Naik Dango'*)

Ceria et al. (2022) state that the Dayak community believes the entire agricultural process involves assistance from *Jubata*; therefore, each stage requires the performance of specific rituals. The significance of rice and its related rituals is deeply integrated into the daily lives of the majority of the Kanayatn Dayak community, who are farmers cultivating rice to sustain their livelihoods (Kwirinus and Yuniarto 2023). According to the Village Head of Ambawang, the Kanayatn Dayak community has inhabited the area for generations and continues to perform agricultural rituals regularly. The agricultural lands are typically owned by families and are situated either near their homes or at a considerable distance within the same village. Generally, community members cultivate their own agricultural land. If they do not manage the land themselves, they may engage in a land-sharing arrangement by delegating its management to others and sharing the harvest with the landowners. The descriptions of the various agricultural rituals conducted by the Kanayatn Dayak community in Ambawang Village are presented as follows.

*Commencement of farming activities (*Nabo' Panyugu Babatak Ngawaha' ka Uma*)*

This ritual is performed by visiting a sacred statue known as the *penyugu* to engage in communal prayer and seek permission from ancestral spirits, as well as from the great trees, land, and water, marking the community's readiness to begin farming activities. The ritual is conducted to ensure the landowner's health and protection from malevolent spirits throughout the farming season. The *nabo'panyugu babatak ngawaha' ka uma* ritual takes place every June at the summit of Gunung Ambawang and is attended by the *timanggong* (customary leader), the *penyangahatn* (*imam* or prayer leader), *pasirah* (the head of the hamlet), *pangaraga adat* (the individuals responsible for preparing the ritual implements), *tua tahun* (the elders), and the local inhabitants. During this ritual, several ceremonial offerings are prepared, including various types of plants, coins, lanterns, traditional cakes such as *tumpi* (rice flour fritter) and *lemang* (bamboo sticky rice), a rooster, local chicken eggs, plates, and *lempeng* (trays).

*Protection of rice from pests and diseases (*Ngeliliratn Penyakit Padi*)*

This ritual serves as a ceremonial procedure to mitigate or eliminate rice pests and diseases that threaten crop health. It is conducted when the rice plants are approximately two months old, typically in November. The ritual begins with the collection of various parts of the rice plants exhibiting signs of infestation, such as stems and leaves affected by caterpillars or other pests. Following the collection, landowning community members convene at the residence of the elders to construct a miniature boat using areca palm fronds (*Areca catechu*). Essential ceremonial offerings for this ritual include an assortment of plants, plates, trays, free-range chicken eggs, a rooster, and a knife.

Table 1. Plant species used in agricultural traditional ceremonies by the Dayak Kanayatn community in Ambawang Village, Kubu Raya District, West Kalimantan Province, Indonesia

Plant name (Local name; Scientific name)	Classification	Used parts	Traditional ritual	Plant meaning in traditional ritual	Location or source of collection	Conservation status in IUCN
Padi ("*padi dana*"; *Oryza sativa*)	Family: Poaceae Order: Poales Class: Liliopsida	Seed	*Nabo' panyugu babatak ngawaha' ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango'* *Balala'*	Offerings for ancestral spirits	Paddy field	Stable
Padi ketan ("*padi poe*"; *Oryza sativa* var. *glutinosa*)	Family: Poaceae Order: Poales Class: Liliopsida	Seed	*Nabo' panyugu babatak ngawaha' ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango'* *Balala'*	Offerings for ancestral spirits	Paddy field	Stable
Hanjuang or *andong* ("*kenjuank*", *Cordyline fruticosa*)	Family: Asparagaceae Order: Asparagales Class: Magnoliopsida	Leaf	*Nabo' panyugu babatak ngawaha' ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango'* *Balala'*	A prerequisite for invoking ancestral spirits	Homeyard	Stable
Sirih ("*sirih*"; *Piper betle*)	Family: Piperaceae Order: Piperales Class: Magnoliopsida	Leaf	*Nabo' panyugu babatak ngawaha' ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango'* *Balala'*	Offerings for ancestral spirits	Garden Homeyard Garden Forest	Stable
Nipah (*Nypa fruticans*)	Family: Arecaceae Order: Arecales Class: Magnoliopsida	Leaf	*Nabo' panyugu babatak ngawaha' ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango'* *Balala'*	Offerings for ancestral spirits	Forest	Declining
Tembakau (*Nicotiana tabaccum*)	Family: Solanaceae Order: Solanales Class: Magnoliopsida	Leaf	*Nabo' panyugu babatak ngawaha' ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango'* *Balala'*	Offerings for ancestral spirits	Local shop	Risk of decline

Gambir (“*gamber*”; *Uncaria gambir*)	Family: Magnoliopsida Order: Gentianales Class: Rubiaceae	Leaf	*Nabo’ panyugu babatak ngawaha’ ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango’* *Balala’*	Offerings for ancestral spirits	Garden	Declining
Pinang (“*pinang*”; *Areca catechu*)	Family: Arecaceae Order: Arecales Class: Spermatophytes	Fruit Fruit, Leaf Sheath Fruit	*Nabo’ panyugu babatak ngawaha’ ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango’* *Balala’*	Offerings for ancestral spirits	Homeyard Garden	Declining
Kelapa (“*kelapa*”; *Cocos nucifera*)	Family: Arecaceae Order: Arecales Class: Liliopsida	Leaf Leaf, Fruit Leaf	*Nabo’ panyugu babatak ngawaha’ ka uma* *Ngiliratn penyakit padi* *Bapuar* *Naik dango’* *Balala’*	Protective barrier Protective barrier; offerings for ancestral spirits Protective barrier	Homeyard Garden	Stable
Bambu (“*Buluh*”; *Bambusa vulgaris)*	Family: Poaceae Order: Poales Class: Magnoliopsida	Stem	*Baremah matah tandan padi* *Bapuar* *Naik dango’* *Balala’*	A vessel for offerings to ancestral spirits Offerings for ancestral spirits	Forest	Stable
Simpur (“*Simpur*”; *Dillenia suffruticosa*)	Family: Dilleniaceae Order: Dilleniales Class: Magnoliopsida	Leaf	*Nabo’ panyugu babatak ngawaha’ ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango’* *Balala’*	A vessel for offerings to ancestral spirits	Forest	Stable
Rotan (“*Ui*”; *Calamus javensis*)	Family: Arecaceae Order: Arecales Class: Liliopsida	Stem Stem, Leaf	*Nabo’ panyugu babatak ngawaha’ ka uma* *Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango’* *Balala’*	String for tying ceremonial items Ritual items	Forest	Stable
Pisang (“*pisang*”; *Musa x paradisiaca*)	Family: Musaceae Order: Zingiberales Class: Monocotyledone	Fruit, Leaf Leaf Fruit Fruit, Leaf	*Ngiliratn penyakit padi* *Baremah matah tandan padi* *Bapuar* *Naik dango’*	Food for spirits; traditional display container A vessel for offerings to ancestral spirits Ritual items	Garden	Stable

Kunyit (“*Engkunyit*”; *Curcuma longa*)	Family: Zingiberaceae Order: Zingiberales Class: Magnoliopsida	Rhizome	*Naik dango’* *Balala’*	Rice dye	Homeyard	Stable
Rumput teki (“*Semalit*”; *Cyperus rotundus*)	Family: Cyperaceae Order: Cyperales Class: Liliopsida	Leaf	*Ngiliratn penyakit padi* *Balala’*	Taboo deterrent	Forest	Stable
Kayu arus (“*Kayu arus*”; (*Radermachera sinica*)	Family: Bignoniaceae Order: Lamiales Class: Magnoliopsida (dicots)	Stem, Root	*Balala’*	A dwelling for spirits	Forest	Declining
Allamanda (“*Bunga paet*“; *Allamanda cathartica*)	Family: Apocynaceae Order: Gentianales Class: Magnoliopsida	Flower	*Bapuar*	Symbol of the crown	Homeyard	Risk of decline
Sagu (“*Sagu*”; *(Metroxylon sagu)*	Family: Arecaceae Order: Arecales Class: Liliopsida	Leaf	*Bapuar*	Offerings for ancestral spirits	Forest	Stable
Paku sarang burung (“*Sonoh*”; *Asplenium australasiacum*)	Family: Aspleniaceae Order: Polypodiales Class: Pteridopsida	Leaf	*Balala’*	Spiritual healer	Forest	Stable
Jengkol (“*Jarik*”; *Archidendron pauciflorum*)	Family: Fabaceae Order: Fabales Class: Magnoliopsida	Leaf, Root	*Ngiliratn penyakit padi*	Rice disease deterrent	Garden	Declining
Selasih (“*Bunga selasih*”; *Ocimum basilicum*)	Family: Lamiaceae Order: Lamiales Class: Magnoliopsida	Flower	*Ngiliratn penyakit padi*	Rice disease remover	Garden	Declining
Kayu ara (*Ficus racemosa*)	Family: Moraceae Order: Urticales Class: Magnoliopsida	Stem	*Balala’*	Evil spirit repellent	Forest	Stable
Kayu bemali (*Leea indica*)	Family: Vitaceae Order: Vitales Class: Magnoliopsida (dicots)	Stem	*Balala’*	Evil spirit repellent	Forest	Stable
Ribu-ribu (*Lygodium japonicum*)	Family: Lygodiaceae Order: Schizaeales Class: Pteridopsida	Tendril	*Balala’*	Offerings for ancestral spirits	Forest	Stable

Once all the ceremonial items are gathered, the *ngeliliratn penyakit padi* ritual begins with a prayer led by the *imam*. Subsequently, the imam, the elders, and the landowner proceed to the Ambawang River to release the miniature boat containing the collected afflicted plant materials. Before launching the boat, the imam recites a mantra commanding "all rice diseases to return to their source." Rooster is then sacrificed, and its blood is placed on a plate as part of the ritual offerings. In conjunction with the afflicted plant materials and the rooster's blood, various types of plants are also cast into the river. The primary objective of this ritual is to protect the rice crop, thereby reducing the likelihood of crop failure. The *ngeliliratn penyakit padi* ritual is attended by community leaders, including imam, the head of the hamlet, the individuals responsible for preparing ritual implements, the elders, landowners, and members of the local inhabitants.

*Rice harvest ceremony (*Baremah Matah Tandan Padi*)*

Once the rice plants reach harvest season, indicated by most of the rice grains turning golden, the *baremah matah tandan padi* ceremony is performed. This traditional ritual involves picking or gathering a portion of the harvest but not the entire crop, only a small selection is taken for ceremonial purposes. The aim of this ritual is to ensure an abundant harvest and to bless the harvesters with good health. The *baremah matah tandan padi* ceremony takes place in a community field and is attended by key cultural figures such as the customary leader, imam, the head of the hamlet, the individuals responsible for preparing ritual implements, the elders, and the local inhabitants. Several ceremonial items are required for the ritual, including specific plants, local chicken eggs, plates, and an oil lamp. Once these items are gathered, they are taken to the field, where a communal prayer, led by the imam, marks the start of the ceremony.

*New rice Thanksgiving ceremony (*Bapuar*)*

The *bapuar* ceremony, or new rice thanksgiving, is held after the rice harvest is completed. This ritual begins with a communal prayer at the home of the village elder, attended by community members and led by the imam. Following the prayer, the imam distributes ceremonial items for safekeeping in each household. Afterward, the community begins cooking the newly harvested rice, which is then shared in a communal meal. The *bapuar* ceremony is a gesture of gratitude to Jubata for the blessings of the new rice harvest. The ceremony requires several ritual items, including various plants, coins, an oil lamp, traditional snacks (such as *tumpi* and *lemang*), a rooster, local chicken eggs, plates, and a tray.

*New rice year celebration (*Naik Dango'*)*

The *naik dango'* ceremony is a symbolic ritual in which newly harvested rice is symbolically stored in a sanctified rice barn, signifying the transition to a new agricultural cycle. Concurrently, the community prepares *lemang* and gathers to slaughter a chicken or pig at a communal gathering space, typically the village hall or customary house. This ritual serves as an expression of gratitude to *Jubata* (the local deity) for the harvest's abundance and is an integral aspect of the Kanayatn Dayak's agricultural traditions. The *naik dango'* ceremony is observed annually on April 27 at the village's customary house or meeting hall, adorned with *kenjuangk* (*Cordyline fruticosa*) and young leaves from various plant species. This joyous event is often referred to as the "New Rice Year Festival." The celebration involves the Kanayatn Dayak community, cultural leaders of Ambawang Village, and visitors from surrounding areas. Specific ritual items are prepared for sacred offerings, including various plant species, free-range chicken eggs, oil lamps, and a tray. These offerings are presented at significant locations such as statues, sacred trees like the *kayuarus* (*Radermachera sinica*) on Mount Ambawang, as well as near the local dam and village entrance. Guests from neighboring communities traditionally participate by sharing in the communal meal as part of their customary obligations.

*Ritual of abstinence (*Bepantang or Balala'*)*

The *balala'* ritual, part of the *bepantang* tradition, is practiced honoring ancestral customs, express gratitude, and seek daily protection from harm. The ritual begins with a community effort to clean the sacred statue (*pentula'*) and its surroundings, which the residents of Ambawang Village regard as a place of worship. Ritual offerings include specific plants, coins, an oil lamp, various traditional snacks (especially *tumpi*, *lemang*, and *bontong* or bamboo rice cake), a cooked rooster, free-range eggs, plates, trays, *cangkir* (cups), coconut oil, and cleansing powder, all of which are prepared and arranged at the sacred statue. The *bepantang* (*balala'*) ritual begins with an opening ceremony led by the imam, with the community gathered around the sacred statue. The imam offers a prayer to the ancestors and Jubata, marking the beginning of *bepantang*. Afterward, the imam takes a portion of the offerings, while the rest are distributed to participants, who place them above their doorways as a sign of observing the *bepantang* tradition. During *bepantang*, abstinence is observed from 6:00 PM on May 28 to 6:00 PM on May 29, during which villagers refrain from leaving their homes. Restrictions prohibit bringing animals such as pigs, dogs, *renjong* (crabs), shrimp, or *seluang* (fish) indoors, as well as engaging in heavy labor or using sharp tools. This observance encourages gratitude, respect for nature, and reverence for the Creator. The *bepantang* (*balala'*) ritual takes place at the site of the sacred statue on Mount Ambawang and is attended by cultural figures, including the customary leader, imam, the head of the hamlet, the individuals responsible for preparing the ritual implements, the elders, and local inhabitants.

Plants used in agricultural rituals of the Kanayatn community in Ambawang Village

The ethnobotanical study of the Kanayatn Dayak community in Ambawang Village has identified 24 plant species utilized in agricultural rituals (Table 1). The family Araceae is the most frequently utilized, comprising five species: *pinang* or areca palm (*A. catechu*), *sagu* or sago (*Metroxylon sagu*), coconut (*Cocos nucifera*), *ui'* or rattan

(*Calamus javensis*), and *nipah* or nipa palm (*Nypa fruticans*). Following this, the family Poaceae includes paddy (*Oryza sativa*) and bamboo (*Bambusa vulgaris*). The study identified 16 distinct meanings attributed to these plants in agricultural rituals, according to the beliefs of the Kanayatn Dayak community in Ambawang Village. Paddy (both common rice and glutinous rice), *sirih* or betel leaves (*Piper betle*), *N. fruticans*, *tembakau* or tobacco (*Nicotiana tabacum*), *gamber* (*Uncaria gambir*), *A. catechu*, and *M. sagu* are consistently used as offerings to ancestral spirits. Specifically, *C. fruticosa* is employed as a prerequisite for invoking ancestral spirits, and *simpur* (*Dillenia suffruticosa*) serves as a vessel for offerings to these spirits. Some plants hold multiple symbolic meanings, either within the same ritual or across different ceremonies. For example, *C. nucifera* functions both as a protective barrier and as an offering to ancestral spirits during the *naik dango'* ceremony, while *B. vulgaris* serves as a dish for ancestral spirits in the *baremah matah tandan padi* ritual and as an offering during the *naik dango'* ceremony. Additionally, *pisang* or bananas (*Musa x paradisiaca*) are used as food for spirits and as ritual items in the *ngeliliratn* ceremony and as offerings to spirits in the *naik dango'* ritual. Furthermore, certain plant parts convey similar meanings, such as the fruit and fronds of the *A. catechu* as offerings for ancestral spirits in the *ngeliliratn* ritual, and the trunk and roots of the *R. sinica* tree serving as a dwelling for spirits.

The Kanayatn Dayak people gather plants for traditional rituals from various locations, including rice fields, home gardens, forests, and cultivated plots. However, *N. tabacum* is no longer available within Ambawang Village, so the community purchases it from local shops. The forest serves as the primary source for ritual plants, supplying 11 out of the 24 species used, such as *N. fruticans*, *B. vulgaris*, *D. suffruticosa*, *C. javensis*, *semalit* or nut grass (*Cyperus rotundus*), *M. sagu*, *paku sarang burung* or bird's nest fern (*Asplenium australasiacum*), *kayu arus* (*R. sinica*), *kayu ara* (*Ficus racemosa*), *kayu bemali* (*Leea indica*), and *ribu-ribu* (*Lygodium japonicum*). From cultivated plots, the community gathers *jarik* (*Archidendron pauciflorum*), *selasih* or basil (*Ocimum basilicum*), *U. gambir*, and *M. x paradisiaca*. Some of these plants, such as *P. betle*, *C. fruticosa*, *engkunyit* or turmeric (*Curcuma longa*), *C. nucifera*, *bunga paet* or *allamanda* (*Allamanda cathartica*), and *A. catechu*, are also grown in home gardens. There are no strict location requirements for sourcing ritual plants, as they are collected based on availability. However, field observations indicate that the population of *R. sinica* is critically low, with only a single tree remaining in the area, raising concerns about its future availability for ritual use.

Based on conservation status according to the IUCN Red List of Threatened Species (2024) (accessed July 15, 2024), 16 out of the 24 plant species used in traditional agricultural rituals remain stable, 2 species are at risk of decline, and 6 species are currently in decline. The species classified as declining are *N. fruticans*, *U. gambir*, *A. catechu*, *R. sinica*, *A. pauciflorum*, and *O. basilicum*, while those at risk of decline include *A. cathartica* and *N. tabacum*. According to Indonesian Ministry of Environment and Forestry Regulation No. P106 (2018) (Permen LHK No. P106 Year 2018), of the 24 plant species used in traditional agricultural rituals, only *A. catechu* is classified as a protected species.

The number of plant species used in each traditional agricultural ritual varies between 13 and 19 species (Figure 3). Nine out of the 24 identified plant species are utilized across all six traditional agricultural rituals. Generally, these nine plants hold similar symbolic meanings in different rituals. Among the six rituals, the *balala* (*bepantang*) ritual employs the highest number of plant species, totaling 19. The nine commonly used species include *O. sativa* (both common and glutinous rice), *C. fruticosa*, *P. betle*, *N. fruticans*, *N. tabacum*, *U. gambir*, *A. catechu*, *D. suffruticosa*, and *C. javensis*. The remaining nine species are each used exclusively in a single ritual, namely *R. sinica*, *A. cathartica*, *M. sagu*, *A. australasiacum*, *A. pauciflorum*, *O. basilicum*, *F. racemosa*, *L. indica*, and *L. japonicum*.

The plant parts used in traditional rituals vary and include seeds, leaves, stems, roots, tendrils, fruits, sheaths, and rhizomes (Figure 4). Among these, leaves are the most utilized, while tendrils and rhizomes are the least used. Generally, only specific parts of each plant species are harvested. For example, *O. sativa* is primarily valued for its seeds, whereas the leaves of *C. fruticosa*, *P. betle*, *N. fruticans*, *N. tabacum*, *U. gambir*, *D. suffruticosa*, and *C. rotundus* are commonly collected. Some plants have distinct symbolic meanings associated with different parts; for instance, the leaves of *C. nucifera* represent a protective barrier, while its fruit is offered to ancestral spirits. In contrast, certain plants that utilize multiple parts may carry the same symbolic meaning. For example, *A. pauciflorum* is used for both its leaves and roots, both of which are believed to ward off rice diseases.

Discussion

The Kanayatn Dayak community in Ambawang Village, Kubu Raya District, continues to preserve the traditional agricultural ritual known as *Adat Bahuma*. This ritual comprises a series of customary ceremonies performed at various stages of the agricultural cycle, particularly in rice cultivation. Based on interviews and observations, six main rituals were identified within the *Adat Bahuma* tradition: (i) *Nabo'panyugu babatak ngawaha' ka uma*-marks the initiation of farming activities, (ii) *Ngeliliratn*-aims to protect rice crops from pests and diseases, (iii) *Baremah matah tandan padi*-a rice harvest ceremony, (iv) *Bapuar*-a thanksgiving ritual following the rice harvest, involving offerings of newly harvested rice, (v) *Naik dango'*-a rice new year celebration that signifies the beginning of a new agricultural cycle, and (vi) *Balala'*-an abstinence ritual conducted after the harvest cycle is completed. Each of these rituals holds profound spiritual significance, reflecting the community's deep connection with nature and their devotion to God (*Jubata*), who is believed to be the source of life. As noted by Ceria et al. (2022), the entire agricultural process involves spiritual assistance from *Jubata*, emphasizing the necessity of

performing specific rituals at each stage of farming. This belief underscores the notion that agricultural success is deeply dependent on divine blessings and protection.

The cultivation of rice by the Kanayatn Dayak community is primarily for family consumption rather than commercial purposes. This subsistence-based agricultural practice focuses on ensuring that rice harvests meet household needs. While bartering rice among families is acceptable, selling it is considered a violation of traditional values. Rice is regarded as a sacred gift from *Jubata* and a symbol of life, which is why its commercialization is discouraged. The continued practice of *Adat Bahuma* rituals underscores the central role of rice in the daily lives and cultural identity of the Kanayatn Dayak community.

Most community members work as farmers, with rice serving as their primary commodity for both food security and ritual purposes. Rice holds profound cultural, traditional, and spiritual significance for the Dayak Kanayatn people, making each phase of agriculture a sacred process (Helena et al. 2023; Bahari et al. 2024). Agricultural land is generally family-owned and located near their homes or within the village area. If a family is unable to cultivate their land, they may entrust it to others under a profit-sharing arrangement. This practice reflects a strong tradition of mutual aid and cooperation within the Kanayatn Dayak community, reinforcing kinship ties and social solidarity among its members.

Ethnobotanical studies on the Kanayatn Dayak community in Ambawang Village highlight the significant role of plants in traditional agricultural rituals, both as essential materials for ceremonies and as spiritual and cultural symbols. A total of 24 plant species have been identified as integral to these rituals, particularly within the context of *Adat Bahuma*. One key finding of this study is the diverse utilization of plant species across various families, with Araceae and Poaceae being the most dominant. Five species from the Araceae family (*A. catechu*, *M. sagu*, *C. nucifera*, *C. javensis*, and *N. fruticans*) are widely used in different rituals, underscoring their cultural importance in Dayak Kanayatn traditions. Similarly, *O. sativa* and *B. vulgaris* from the Poaceae family serve as symbols of life in this agrarian society, playing a crucial role in agricultural rituals. Rice, in particular, is regarded as a sacred offering for ancestral spirits, a significance also noted in Wulandari et al. (2024) in their study on the role of rice in the traditional beliefs of the Iban Dayak community in Mensiau Village, Batang Lupar District, Kapuas Hulu Regency.

The use of plants as offerings for ancestral spirits, such as *O. sativa*, *P. betle*, *N. fruticans*, and *N. tabacum*, reflects the spiritual beliefs of the Kanayatn Dayak community, in which plants serve as intermediaries between humans and ancestral spirits. *C. fruticosa* is used to invoke ancestral spirits, while *D. suffruticosa* functions as a vessel for offerings, demonstrating that each plant carries a specific symbolic meaning within the ritual structure. Utami et al. (2023), in their study of the Dayak Limbai community in Melawi, and Herianto et al. (2018), who focused on the Dayak Ot Danum in East Kotawaringin, similarly found that plant elements in Dayak rituals hold symbolic roles closely tied to their spiritual beliefs, particularly in maintaining the balance between nature and ancestral spirits.

The number of plant species used in each traditional agricultural ritual by the Kanayatn Dayak community in Ambawang Village varies between 13 and 19 species. Nine out of the 24 identified plant species are consistently utilized across all agricultural rituals, typically carrying the same meanings even when used in different rituals. This finding suggests that certain plant species play a central role in ritual practices, such as *O. sativa*, *C. fruticosa*, *P. betle*, *N. fruticans*, and *N. tabacum*. These plants serve as symbolic species that reinforce the beliefs and spirituality of the Kanayatn Dayak community. In indigenous cultures, plants are not merely natural resources but also hold profound spiritual significance, with specific plant parts serving as mediums for communication with ancestors and nature spirits (Koithan and Farrell 2010; Turner 2016, et al. 2022).

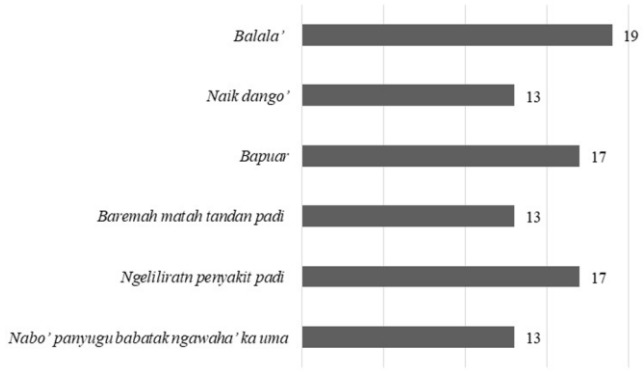

Figure 3. The number of plants used in each traditional agricultural ritual by the Kanayatn Dayak community in Ambawang Village, Kubu Raya District, West Kalimantan, Indonesia

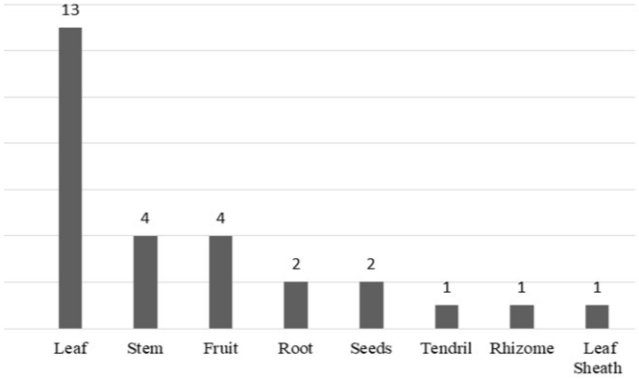

Figure 4. Comparison of plant parts used for traditional agricultural rituals by the Kanayatn Dayak community in Ambawang Village, Kubu Raya District, West Kalimantan, Indonesia

The *balala* or *bepantang* ritual, which involves observing taboos to maintain harmony between humans, nature, and ancestors, utilizes the largest number of plant species, totaling 19. This underscores the ritual's significance as one of the central agricultural traditions, where a diverse range of plants is used to seek protection and blessings from ancestral spirits during the period of abstinence. Furthermore, the ritual reflects the intricate connection between plant utilization and spiritual beliefs, with each plant playing a specific role and carrying distinct symbolic meanings that contribute to the overall ceremonial process.

Fernandes et al. (2022) found that in the agricultural traditions of indigenous communities, the use of various plant species reflects the belief in blessings and protection from ancestral spirits, who are considered active participants in sustaining agricultural practices. A similar ritual, known as *beremah benua*, is practiced among the Kanayatn Dayak community in Nyayum Village, Landak District, as noted by Musmuliadi et al. (2022). This ritual shares the same purpose as the *balala* ritual but is referred to by a different name. Moreover, the number of plant species used in the *beremah benua* ritual in Nyayum (25 species) exceeds that in Ambawang (19 species). Commonly used plant species include *B. vulgaris*, *A. catechu*, *C. fruticosa*, the leaf of *P. betle*, *N. tabacum*, *O. sativa* (both common and glutinous paddy), *C. longa*, *U. gambir*, and *D. suffruticosa*. Several factors may contribute to these differences, such as access to plant resources, local variations in cultural traditions and beliefs, as well as social changes and modernization. Further studies are needed to explore this phenomenon.

The parts of plants used in traditional agricultural rituals vary, including seeds, leaves, stems, roots, tendrils, fruits, sheaths, and rhizomes. However, leaves are the most utilized, particularly in rituals involving *P. betle*, *N. fruticans*, *N. tabacum*, and *C. fruticosa*. The frequent use of leaves reflects their symbolic association with freshness, life, and regenerative power. Leaves are also widely recognized as the most used plant parts in traditional medicine (Supiandi et al. 2019b; Az-Zahra et al. 2021). In the agricultural practices of the Dayak community, various plants play significant roles beyond rituals. For instance, the presence of certain plant species serves as an indicator of soil fertility, guiding farmers in their land-use decisions. This traditional knowledge demonstrates the deep connection between the Dayak people and their natural environment, where plants and their characteristics are integral to both cultural practices and ecological understanding (Murhaini and Achmadi 2021).

The use of different plant parts to convey distinct meanings within a single ritual is a significant finding. For example, the leaves of *C. nucifera* serve as protective barriers, while its fruit functions as an offering to ancestral spirits. This highlights the intricate spiritual symbolism attributed to various plant parts in the Kanayatn Dayak's traditions. Specific plant parts can hold different meanings based on their ritualistic functions, reflecting the community's belief in maintaining harmony between nature and the spiritual world (Frazão-Moreira 2016; Iskandar and Iskandar 2017).

The study also revealed that most of the plants utilized in traditional rituals are obtained from natural surroundings, such as forests, gardens, yards, and rice fields. The forest serves as the primary source for 11 types of plants used, including important species such as *N. fruticans*, *B. vulgaris*, *C. javensis*, and *R. sinica*. This finding underscores the Kanayatn Dayak community's reliance on forest sustainability, as these ecosystems provide essential materials for their sacred rituals. Similarly, Usop and Rajiani (2021) highlights the central role of forests in both the spiritual and economic life of the Dayak indigenous community, as observed in the Ngaju Dayak community in Gunung Mas Regency, Central Kalimantan, reinforcing the importance of forest conservation for the continuity of traditional practices.

However, concerns arise regarding the conservation status of the plants used. According to the IUCN Red List, 6 out of 24 plant species utilized are experiencing population declines, including *N. fruticans*, *U. gambir*, *A. catechu*, *R. sinica*, *A. pauciflorum*, and *O. basilicum*. Additionally, *A. cathartica* and *N. tabacum* are also at risk of decline, further indicating pressure on natural resources vital to the community. The decline of these plant species not only threatens ritual practices but also reflects a broader global trend. As Priadka et al. (2022) highlight, biodiversity loss increases the risk of food insecurity, particularly for indigenous communities that depend on natural resources. Saputra (2020) emphasizes that local wisdom plays a crucial role in maintaining ecological balance, where traditional practices help conserve the environment while strengthening cultural identity and social cohesion. The cultural importance of *A. catechu* is further emphasized by its inclusion in Indonesia's list of protected species under Permen LHK Number P.106 of 2018. However, many other ritual plants with high cultural significance have not received similar conservation attention. This situation underscores the urgency of integrating traditional ecological knowledge with conservation policies, ensuring that cultural heritage and biodiversity can be safeguarded simultaneously.

The various traditional ceremonies of the Kanayatn Dayak community in Ambawang Village, Kubu Raya District, serve not only as cultural expressions but also as valuable lessons in social life, environmental appreciation, and traditional knowledge. These ceremonies instill values such as gratitude, respect for nature, patience, sharing, togetherness, and cultural preservation to prevent extinction. Therefore, safeguarding this cultural heritage is essential to ensure its continuity for future generations. Similar traditions exist in other indigenous communities. For example, in the Atoin Meto community, traditional dances performed during ceremonies symbolize daily life and natural cycles, reinforcing values of solidarity and respect (Taneo et al. 2024). Likewise, Javanese ceremonies embody social values such as gratitude, cooperation, and environmental stewardship, fostering communal bonds and cultural continuity (Sobaya et al. 2023). These parallels highlight the universal role of traditional rituals in

strengthening social and ecological resilience. Moreover, cultural preservation is closely tied to environmental conservation. The knowledge of the Kanayatn Dayak in utilizing plants for ceremonies must be consistently passed down to sustain their cultural identity and prevent the loss of traditional ecological wisdom. This effort not only ensures the continuation of cultural traditions but also introduces locally significant plants to a wider audience. This study concludes that the Kanayatn Dayak community in Ambawang Village still retains significant knowledge of plant use in traditional ceremonies, underscoring the need for sustained efforts in cultural and environmental conservation.

To conclude, the agricultural rituals of the Kanayatn Dayak community in Ambawang Village are more than cultural traditions—they are living expressions of a deep connection to land, plants, and ancestral memory. Through *Adat Bahuma*, each stage of rice cultivation becomes a moment to honor nature, give thanks, and strengthen the bonds between people and the world around them. The plants used in these ceremonies are not chosen at random; they carry meaning, history, and spiritual weight. Yet, many of these important species are becoming harder to find, and with them, the knowledge tied to their use risks fading. Protecting this tradition means more than documenting it—it means listening, learning, and standing with communities who have long understood the value of harmony with nature. As the world moves forward, there is much we can learn from the care, patience, and reverence the Kanayatn Dayak people bring to their fields, forests, and ceremonies. Keeping this knowledge alive is not just about the past, it's a way to imagine a more grounded and respectful future.

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REFERENCES

Athar M, Bokhar TZ. 2006. Ethnobotany and production constraints of traditional and commonly used vegetables of Pakistan. Intl J Veg Sci 12 (2): 27-38. DOI: 10.1300/J484v12n02_04.

Az-Zahra FR, Sari NLW, Saputry R, Nugroho GD, Sunarto, Pribadi T, Setyawan AD. 2021. Review: Traditional knowledge of the Dayak Tribe (Borneo) in the use of medicinal plants. Biodiversitas 22 (10): 4633-4647. DOI: 10.13057/biodiv/d221057.

Bahari Y, Matsum JH, Ismiyani N. 2024. Inovation in implementation of Naik Dango tradition on Dayak Kanayatn Society in the modern era. Intl J Res Innov Soc Sci 7 (12): 808-820. DOI: 10.47772/IJRISS.2023.7012062.

Beno YC, Anwari MS, Dirhamsyah M. 2022. Etnozoologi untuk ritual adat masyarakat Dayak Kanayatn di Desa Saham Kecamatan Sengah Temila Kabupaten Landak. Jurnal Hutan Lestari 10 (2): 231-242. DOI: 10.26418/jhl.v10i2.44880. [Indonesian]

Candramila W, Erasmawanti D, Sihombing DR. 2018. Eating behavior of the rural communities in West Kalimantan. Al-Kauniyah: Jurnal Biologi 11 (2): 190-207. DOI: 10.15408/kauniyah.v11i2.7615.

Ceria, Zega YK, Widjaja FI. 2022. Contextual mission construction according to the Jubata concept in the Kanayatn Dayak tribe in introducing the Triune God. Intl J Indones Philos Theol 3 (2): 110-121. DOI: 10.47043/ijipth.v3i2.34.

Chaachouay N, Zidane L. 2022. The symbolic efficacy of plants in rituals and socio-religious ceremonies in Morocco, Northwest of Africa. J Relig Theol Inf 21 (1-2): 34-53. DOI: 10.1080/10477845.2021.1942433.

Cresswell JW. 2014. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches 4th Edition. SAGE Publication, Inc., Thousand Oaks, California.

Dirgari Y, Syamswisna, Tenriawaru AB. 2022. Studi etnobotani upacara adat budaya menanam padi Suku Dayak Bakati' di Dusun Segiring Kabupaten Bengkayang. Bioscientist: Jurnal Ilmiah Biologi 10 (1): 35-46. DOI: 10.33394/bioscientist.v10i1.4606. [Indonesian]

Efendi M, Sahrul M, Salma S. 2020. Nilai kearifan lokal tradisi manugal masyarakat Dayak Meratus Kalimantan Selatan pada materi geografi bidang lingkungan hidup (kajian etnografi). Padaringan: Jurnal Pendidikan Sosiologi Antropologi 2 (2): 260-270. DOI: 10.20527/padaringan.v2i2.2158. [Indonesian]

Ege B, Julung H, Supiandi MI. 2022. Utilization of local fruits as food source for the Dayak Jangkang Tribe, West Kalimantan. IOP Conf Ser Earth Environ Sci 978 (1): 012049. DOI: 10.1088/1755-1315/978/1/012049.

Fernandes LM, Visscher AM, do Couto HTZ. 2022. Indigenous agriculture at the beginning of the twenty-first century: The Guaraní Mbyás minority conserves ethnoknowledge and agrobiodiversity within the remnants of the Brazilian Atlantic Forest. Agrofor Syst 96 (8): 1211-1224. DOI: 10.1007/s10457-022-00780-5.

Frazão-Moreira A. 2016. The symbolic efficacy of medicinal plants: Practices, knowledge, and religious beliefs amongst the Nalu Healers of Guinea-Bissau. J Ethnobiol Ethnomed 12 (1): 24. DOI: 10.1186/s13002-016-0095-x.

Gaoue OG, Coe MA, Bond M. 2017. Theories and major hypotheses in ethnobotany. Econ Bot 71 (3): 269-287. DOI: 10.1007/s12231-017-9389-8.

Hadiwijoyo E, Saharjo BH, Putra EI. 2017. Kearifan lokal masyarakat Dayak Ngaju di Kalimantan Tengah dalam melakukan penyiapan lahan dengan pembakaran. Jurnal Silvikultur Tropika 8 (1): 1-8. DOI: 10.29244/j-siltrop.8.1.1-8. [Indonesian]

Haziki, Syamswisna. 2021. Studi etnobotani tumbuhan obat tradisional oleh masyarakat di Kelurahan Setapuk Kecil Singkawang. Biocelebes 15 (1): 76-86. DOI: 10.22487/bioceb.v15i1.15471. [Indonesian]

Helena, Bahari Y, Ismiyani N. 2023. Analysis of Naik Dango tradition values in the Dayak Kanayatn Ethnicity in Bandang Hamlet. Jurnal Pendidikan Sosiologi Humaniora 14 (2): 322-331. DOI: 10.26418/j-psh.v14i2.63608.

Hendra A, Marseda IA. 2022. Eco-etika dalam budaya Manugal Dayak Ngaju: Tinjauan ekologis berdasarkan Ensiklik Laudato Si Art. 139. Jurnal Pendidikan Bahasa Sastra Seni Budaya 2 (2): 146-154. DOI: 10.37304/enggang.v3i1.4938. [Indonesian]

Herianto, Kusuma Z, Nihayati E. 2018. The plant wisdom of Dayak Ot Danum, Central Kalimantan. J Trop Life Sci 8 (2): 130-143. DOI: 10.11594/jtls.08.02.06.

Iskandar J, Iskandar BS. 2017. Various plants of traditional rituals: Ethnobotanical research among the Baduy Community. Biosaintifika 9 (1): 114-125. DOI: 10.15294/biosaintifika.v9i1.8117.

IUCN Red List of Threatened Species. 2024. IUCN Red List of Threatened Species. https://www.iucnredlist.org/.

Khatib C, Nattouf A, Agha MIH. 2021. Traditional medicines and their common uses in central region of Syria: Hama and homs-an ethnomedicinal survey. Pharm Biol 59 (1): 776-786. DOI: 10.1080/13880209.2021.1936078.

Koithan M, Farrell C. 2010. Indigenous native american healing traditions. J Nurse Pract 6 (6): 477-478. DOI: 10.1016/j.nurpra.2010.03.016.

Kwirinus D, Yuniarto P. 2023. The concept of recycled farming according to Dayak Kanayatn and the cultural dimension. Intl J Ethnic Racial Cult Herit 1 (1): 16-31. DOI: 10.26418/ijerch.v1i1.64439.g75676598179.

Marouf M, Batal M, Moledor S. 2015. Exploring the practice of traditional wild plant collection in Lebanon. Food Cult Soc 18 (3): 355-378. DOI: 10.1080/15528014.2015.1043103.

Murhaini S, Achmadi. 2021. The farming management of Dayak people's community based on local wisdom ecosystem in Kalimantan

Indonesia. Heliyon 7 (12): e0857. DOI: 10.1016/j.heliyon.2021.e08578.
Musmuliadi, Sisillia L, Kartikawati SM. 2022. Etnobotani ritual adat suku Dayak Kanayatn Desa Nyayum, Kecamatan Kuala Behe, Kabupaten Landak. Jurnal Lingkungan Hutan Tropis 1 (2): 357-375. [Indonesian]
Patiola R, Syamswisna, Fajri H. 2023. Ethnobotany of traditional medicinal plants by the Dayak Kanayatn Ahe ethnic in Sumiak Hamlet, Landak Regency, West Kalimantan. Jurnal Penelitian Pendidikan IPA 9 (11): 9619-9628. DOI: 10.29303/jppipa.v9i11.4510.
Priadka P, Moses B, Kozmik C. 2022. Impacts of harvested species declines on indigenous peoples' food sovereignty, well-being and ways of life: A case study of anishinaabe perspectives and moose. Ecol Soc 27 (1): 30. DOI: 10.5751/ES-12995-270130.
Qamariah N, Mulia DS, Fakhrizal D. 2020. Indigenous knowledge of medicinal plants by Dayak community in Mandomai Village, Central Kalimantan, Indonesia. Pharmacogn J 12 (2): 386-390. DOI: 10.5530/pj.2020.12.60.
Roberto, Rafdinal, Wardoyo ERP. 2020. Etnobotani pakaian adat dalam kegiatan ritual masyarakat Etnis Dayak Kanayatn. Protobiont 9 (1): 30-35. DOI: 10.26418/protobiont.v9i1.40156. [Indonesian]
Saputra R. 2020. Konservasi alam berbasis kearifan lokal Suku Kokoda di Kepulauan Ugar, Kabupaten Fakfak, Papua Barat. Jurnal Bios Logos 11 (1): 7-12. DOI: 10.35799/jbl.11.1.2021.30582. [Indonesian]
Sari LCS, Lovadi I, Wardoyo ERP. 2024. Ethnobotanical study on traditional cosmetics practiced by the Dayak Kayong of West Kalimantan, Indonesia. Biodiversitas 25 (7): 2937-2944. DOI: 10.13057/biodiv/d250715.
Sidauruk IM, Komariah S, Ruyadi Y. 2022. Pelestarian lingkungan masyarakat Dayak Kiyu Meratus berbasis kearifan lokal pertanian manugal. Kronik J His Educ Historiogr 6 (1): 1-11. [Indonesian]
Sobaya S, Pusparini MD, Achiria S. 2023. Javanese local wisdom values for development from an islamic perspective. J Islam Econ Lariba 9 (1): 57-78. DOI: 10.20885/jielariba.vol9.iss1.art4.
Soehadha M. 2018. Mitos Datu Ayuh dalam religi aruh: Ajaran lisan tentang persaudaraan Banjar muslim dengan orang Dayak Loksado di Perbukitan Meratus Kalimantan Selatan. Ri'ayah 3 (2): 114-129. DOI: 10.32332/riayah.v3i02.1323. [Indonesian]
Sõukand R, Kalle R, Prakofjewa J. 2024. The importance of the continuity of practice: Ethnobotany of Kihnu Island (Estonia) from 1937 to 2021. Plants People Planet 6 (1): 186-196. DOI: 10.1002/ppp3.10423.
Supiandi MI, Leliavia, Syafruddin D. 2019a. Plant fruits used as food by the Dayak Community of Tamambaloh in Labian Ira'ang Village, Kapuas Hulu District, Indonesia. Biodiversitas 20 (7): 1264-1270. DOI: 10.13057/biodiv/d200706.
Supiandi MI, Mahanal S, Zubaidah S. 2019b. Ethnobotany of traditional medicinal plants used by Dayak Desa community in Sintang, West Kalimantan, Indonesia. Biodiversitas 20 (5): 1264-1270. DOI: 10.13057/biodiv/d200516.
Syamswisna, Sepsamli L. 2022. Exploration of useful plants as medicine by the Kanayatn Dayak Tribe in Tapakng Village of West Kalimantan. Variabel 5 (1): 10-20. DOI: 10.26737/var.v5i1.3204.
Taneo M, Madu A, Ndoen FA. 2024. The cultural heritage of Ume Kbubu: Strengthening Atoin Meto identity through school learning. J Intercult Commun 24 (3): 88-103. DOI: 10.36923/jicc.v24i3.881.
Turner NJ, Cuerrier A, Joseph L. 2022. Well grounded: Indigenous peoples' knowledge, ethnobiology and sustainability. People Nat 4 (3): 627-651. DOI: 10.1002/pan3.10321.
Turner NJ. 2016. Roots of reflection: Spiritual aspects of plant harvesting, ethnoecological practice and sustainability for indigenous peoples of Northwestern North America. Les Actes de Colloques Du Musée Du Quai Branly 6: 665. DOI: 10.4000/actesbranly.665.
Usop SR, Rajiani I. 2021. Indigenous Indonesian Dayak traditional wisdom in reducing deforestation. Indones J Geogr 53 (3): 43546. DOI: 10.22146/ijg.43546.
Utami YE, Syafruddin D, Supiandi MI. 2023. Dayak Limbai Tribe: Plants for the ritual of bathing babies in the river (Mupok). Jurnal Pendidikan Biologi 8 (2): 302-313. DOI: 10.31932/jpbio.v8i2.2792.
van Steenis CGGJ. 2003. Flora. Pradya Paramita, Jakarta. [Indonesian]
Vandebroek I, Albuquerque UP. 2024. Special issue: Ethnobotany for the future: Theory, methods, and social engagement (Part 2). Econ Bot 78: 105-108 DOI: 10.1007/s12231-024-09610-4.
Wulandari RS, Muflihati, Aden LL. 2024. Utilization of plants as traditional food by the Dayak Iban community of Mensiau Village, Batang Lupar District, Kapuas Hulu Regency. Jurnal Biologi Tropis 24 (1): 489-500. DOI: 10.29303/jbt.v24i1.6512.