

Traces of Local Knowledge: An Ethnobotanical Study of Plant Utilization and Local Wisdom of Dayak Communities in West Kalimantan

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Abstract. This research aims to describe the local knowledge of the Dayak people in West Kalimantan in the use of plants and reveal the role of local wisdom in maintaining the sustainability of ethnobotanical knowledge. The research uses a descriptive qualitative approach with ethnobotanical methods. Data collection was carried out through open interviews, participatory observations, and transects with purposively selected key informants, namely indigenous leaders, buyers, and elderly residents who understand traditional knowledge about plants. The data were analyzed descriptively by grouping plants based on categories of use and interpreting the socio-cultural meanings that accompanied them. The results of the study show that the Dayak people use a variety of plants for traditional medicine, food, traditional rituals, as well as ecological and material needs. The types of plants that are widely used include lemongrass, betel nut, ginger, kencur, galangal, soursop leaves, Dayak onions, pandan, bamboo, and areca nut. The use of plants not only has a practical function, but also contains symbolic, spiritual, and ecological values inherent in people's lives. Local wisdom serves as the basis for conservation practices through customary rules, taboos, selective harvesting, and respect for certain forest areas and plants that are considered culturally important. Ethnobotanical knowledge is passed down orally and through direct intergenerational practice, although it currently faces the challenges of modernization and declining involvement of younger generations. This study confirms that the local knowledge of the Dayak people is an important cultural and ecological asset to be documented, preserved, and developed as part of efforts to conserve biodiversity and strengthen the cultural identity of indigenous peoples.

Keywords: Ethnobotany, Local knowledge, Local wisdom, Dayak people, West Kalimantan, Conservation.

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1. Introduction

Ethnobotany examines the dynamic relationships between humans and plants in cultural, ecological, and practical contexts. In Indigenous societies, ethnobotanical knowledge is not merely a list of useful plants, but a living knowledge system that links health, subsistence, ritual, identity, and environmental stewardship. Contemporary scholarship has increasingly emphasized that Indigenous and local ecological knowledge contributes substantially to biodiversity conservation, sustainable resource management, and resilience in changing socio-ecological systems (Sinthumule, 2023). In a broader perspective, local ecological knowledge should also be understood as a dynamic assemblage of know-how, practice, and socially mobilized knowledge shaped by changing socio-environmental contexts rather than as static inherited tradition (Congretel & Pinton, 2020).

West Kalimantan is an important setting for ethnobotanical research because it contains both high biological diversity and rich cultural diversity. Among Dayak communities, plants are deeply embedded in everyday life, including home remedies, food preparation, ritual offerings, building materials, and local environmental management. Recent studies in Indonesia have shown that ethnobotanical knowledge remains highly significant in local communities. For example, research on the Dayak Linoh in Sintang documented 55 medicinal plant species and showed that medicinal knowledge remains strongly maintained among older community members, although intergenerational transmission is becoming increasingly fragile (Julung et al., 2023). Similar evidence from other Indonesian settings also indicates that useful plants are not only associated with medicine but also with household production systems and local economic activities, such as the use of plant resources as natural dyes and as part of ecotourism-based ethnobotanical landscapes (Abdullah et al., 2024; Jabar et al., 2024).

At the same time, ethnobotanical knowledge is increasingly exposed to erosion due to modernization, land-use change, reduced dependence on traditional healing, and the weakening of oral knowledge transmission. Studies from multiple contexts have reported similar trends, noting that ethnomedical systems are under pressure from socio-environmental change and that local knowledge systems are often hybridized, marginalized, or insufficiently documented. Qualitative ethnobotanical work in other local communities has likewise highlighted the urgency of documenting medicinal plant knowledge as a strategy for cultural preservation in the face of social transformation (Bastidas-Bacca et al., 2023).

Beyond documentation, ethnobotanical research has practical relevance for conservation and education. Local ecological knowledge can support conservation planning by identifying culturally protected species, customary harvesting norms, and community-based stewardship practices. Recent studies have shown that local ecological knowledge can inform species and habitat conservation, including in contexts where scientific data remain limited and community stewardship is essential for protecting vulnerable biodiversity (Nkengbeza et al., 2024). Thus, ethnobotanical knowledge is relevant not only for documenting plant use, but also for understanding locally grounded conservation governance.

In education, the integration of local knowledge into biology and science learning has been shown to enhance scientific literacy, contextual understanding, and cultural relevance. Recent studies indicate that local wisdom-based science learning can improve students' scientific literacy and strengthen the contextual meaning of science instruction (Verawati & Wahyudi, 2024). In addition, project-based ethnobotany learning has been shown to support students' ethnomedicine literacy through innovative instructional media (Gani et al., 2024). However, Indonesian scholarship also notes that biology education research based on local wisdom is still relatively limited and needs to be expanded through stronger contextual materials and ethnosciences-oriented learning resources (Fauzi et al., 2024).

The initial draft of this study already identified these core issues, namely plant diversity, medicinal and ritual uses, conservation values, and challenges to knowledge transmission in Dayak communities of West Kalimantan. Building from that draft, this article aims to answer three questions: (1) What plant species are used by Dayak communities in West Kalimantan?; (2) How are

these plants used in daily life, ritual, and environmental management?; (3) How is ethnobotanical knowledge transmitted and what are its implications for conservation and contextual biology education?

2. Method

This study employed a descriptive qualitative design within an ethnobotanical framework. The approach was chosen because the objective was not only to list useful plant species, but also to understand meanings, practices, and cultural values associated with plant use. This orientation is consistent with recent ethnobotanical studies in Indonesia and elsewhere that combine plant inventory with semi-structured interviewing, purposive informant selection, and contextual interpretation of local knowledge.

2.1 Study area

The study was conducted in selected Dayak settlements in West Kalimantan, including Dusun Ongok, Kembayan Subdistrict, Sanggau Regency, and surrounding communities where traditional plant-use practices are still maintained. The areas were selected purposively because they represent rural socio-ecological settings in which home gardens, swiddens, secondary forests, and customary landscapes remain important sources of useful plants. This location and rationale are consistent with the field setting already described in the original draft.

2.2 Participants

Informants consisted of local residents aged approximately 30–73 years, including farmers, homemakers, craftspeople, and community members recognized as knowledgeable in traditional plant use. Informants were selected using purposive sampling based on three criteria:

- (1) direct experience in using plants for medicine, food, ritual, or material purposes;
- (2) knowledge of local plant names and uses; and
- (3) willingness to participate in interviews and field observations.

This strategy follows recent ethnobotanical practice, where key informants are selected based on their cultural authority and experiential knowledge rather than statistical representativeness.

2.3 Data collection

Data were collected through semi-structured interviews, participatory observation, field documentation, and plant inventory. Interviews focused on local plant names, plant parts used, habitat sources, forms of preparation, categories of use, perceived efficacy, symbolic meanings, and knowledge transmission. Observations were conducted both in domestic spaces and in sites where the plants were found, in order to verify contextual use and habitat information. Documentation included photographs of plant species, plant-use practices, and relevant environmental settings. The plant inventory recorded local names, scientific names where identifiable, categories of use, parts used, and sources of habitat. This design aligns with current ethnobotanical field methods that privilege triangulation between spoken knowledge, direct observation, and inventory-based recording.

2.4 Data analysis

The data were analyzed thematically through data reduction, categorization, interpretation, and conclusion drawing. Plant uses were grouped into several analytic categories, namely medicinal,

food, ritual, ecological, and material uses. Narrative accounts from interviews were then interpreted in relation to local wisdom, conservation practices, and intergenerational transmission. To improve analytical clarity for international publication, this article presents the findings through thematic subheadings and interprets them in dialogue with recent literature on Indigenous knowledge, ethnomedical resilience, and local-wisdom-based education.

2.5 Trustworthiness

To strengthen credibility, the study relied on data triangulation across interviews, observation, and documentation. Informant-based cross-checking was also used when plant names or uses were mentioned by more than one participant. For an international journal submission, it would be advisable to add one sentence in the final manuscript stating whether botanical identification was validated using floristic references, herbarium comparison, or expert consultation, because reviewers often request this point in ethnobotanical papers. This recommendation is based on common reporting patterns in recent ethnobotanical publications.

3. Results and Discussion

3.1 Diversity of useful plants

The study found that Dayak communities in West Kalimantan use a wide variety of plants collected from home gardens, swiddens, open land, forests, and surrounding settlement areas. The original draft identified examples such as serai (*Cymbopogon* spp.), sirih (*Piper betle*), jahe (*Zingiber officinale*), kencur (*Kaempferia galanga*), lengkuas (*Alpinia galanga*), daun sirsak (*Annona muricata*), bawang Dayak (*Eleutherine bulbosa*), pinang (*Areca catechu*), and bamboo (*Bambusa* sp.). These findings are consistent with recent Dayak-focused ethnobotanical studies showing strong representation of medicinal taxa and frequent reliance on leaves and rhizomes in traditional plant use (Julung et al., 2023). The identified plants served multiple purposes rather than single isolated functions. Several species were used simultaneously as medicine, food ingredients, and ritual materials, indicating a functional overlap that is typical of ethnobotanical systems rooted in everyday practice. Such multifunctionality has also been documented in recent Indonesian ethnobotanical studies, where useful plants are often embedded in domestic, economic, and conservation-oriented activities (Abdullah et al., 2024; Jabar et al., 2024). The results of the identification of the plants used can be seen in table 1.

Table 1. Types of Plants Used by the Dayak People and Their Functions

No	Local Names of Plants	Scientific Name	Utilization Categories	Part Used	Habitat Resources
1	Serai	<i>Cymbopogon</i> spp.	Medicine, Food	Leaves, Stem	Yard
2	Sirih	<i>Piper betle</i>	Medicine, Tradisional Rituals	Leaves	Yard
3	Jahe	<i>Zingiber officinale</i>	Medicine, Food	Rhizome	Yard
4	Kencur	<i>Kaempferia galanga</i>	Medicine	Rhizome	Yard
5	Lengkuas	<i>Alpinia galanga</i>	Medicine, Food	Rhizome	Yard
6	Daun sirsak	<i>Annona muricata</i>	Medicine	Leave	Yard
7	Bawang Dayak	<i>Eleutherine bulbosa</i>	Medicine	Bulbs	Yard

No	Local Names of Plants	Scientific Name	Utilization Categories	Part Used	Habitat Resources
8	Pinang	<i>Areca catechu</i>	Tradisional Rituals	Fruit	Yard
9	Bambu	<i>Bambusa</i> sp.	Buildings, Ecology	Stem	Forest/Farm
10	Alang-alang	<i>Imperata cylindrica</i>	Buildings, Ecology	Daun, Stem	Open land

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3.2 Patterns of plant use

Plant use in the studied communities can be grouped into four dominant categories: medicinal, food-related, ritual, and ecological/material uses. Medicinal plants were the most prominent category in the draft dataset, used to address common ailments such as fever, digestive problems, inflammation, postpartum recovery, and general health maintenance. Food-related plants functioned both as staple ingredients and as daily spices, while ritual plants were employed in offerings, ceremonies, and symbolic customary practices. Ecological and material uses included plants such as bamboo and alang-alang for shelter, landscape protection, and practical construction.

Leaves and rhizomes were the plant parts most commonly used, largely because they are accessible, easy to process, and available throughout much of the year. Preparation methods were relatively simple and environmentally low-impact, including boiling, pounding, direct application, or immediate culinary use. Similar preparation patterns have been reported in recent ethnobotanical studies from Indonesian communities and beyond, where decoction and direct application remain dominant forms of household ethnomedicine.

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3.3 Local wisdom and conservation practices

The findings show that plant use is inseparable from local wisdom governing human–nature relations. In the draft manuscript, these values were reflected in practices such as restrictions on cutting certain trees, customary management of culturally important forest areas, ritual expressions of gratitude to nature, and replanting practices. These practices indicate that ethnobotanical knowledge does not operate as an isolated technical skill, but as part of a broader moral-ecological system that regulates resource use and helps maintain biodiversity.

This finding is well aligned with recent scholarship demonstrating that traditional ecological knowledge supports biodiversity conservation by guiding species protection, habitat stewardship,

and locally legitimate forms of environmental regulation. Systematic and conceptual reviews published in recent years have emphasized that Indigenous and local knowledge contributes not only to species identification and use, but also to community-level conservation governance and resilience (Congretel & Pinton, 2020; Sinthumule, 2023). Similar evidence has also been reported in conservation-oriented studies showing that local ecological knowledge can help inform protection strategies for understudied species and ecosystems (Nkengbeza et al., 2024).

3.4 Intergenerational transmission of ethnobotanical knowledge

The study also found that ethnobotanical knowledge is transmitted primarily through oral communication, observation, and direct participation in farming, healing, food preparation, and ritual practice. In the draft, this transmission was described as informal and family-based, depending heavily on daily interaction within the household and community. However, informants also expressed concern that younger generations are becoming less interested in learning traditional plant knowledge. This concern echoes recent ethnobotanical and ethnomedical literature showing that modernization, formal schooling disconnected from local context, environmental change, and declining practical engagement can weaken local knowledge transmission (Bastidas-Bacca et al., 2023; Julung et al., 2023).

3.5. Discussion

This study confirms that ethnobotanical knowledge among Dayak communities in West Kalimantan remains rich, multifunctional, and culturally embedded. The results suggest that plant use cannot be reduced to utilitarian consumption alone; it is part of a knowledge system that connects healthcare, food sovereignty, social identity, ritual continuity, and environmental ethics. This interpretation is consistent with recent arguments that Indigenous and local ecological knowledge should be understood as a dynamic system of practice, know-how, and socio-ecological adaptation rather than as static folklore (Congretel & Pinton, 2020; Sinthumule, 2023).

The dominance of medicinal plants in the findings deserves particular attention. Similar to the Dayak Linoh study in Sintang, medicinal plants in this study form a major component of community knowledge and household health strategies. This suggests that ethnomedicine remains a relevant dimension of rural health culture in West Kalimantan, especially where experiential knowledge, plant availability, and cultural trust continue to shape treatment choices. At the same time, the resilience of such ethnomedical systems is not guaranteed. Recent analyses emphasize that these systems are vulnerable to contamination, land-use change, policy shifts, and the growing influence of biomedical and market-based alternatives.

Another important contribution of this study is its demonstration that local wisdom functions as a practical conservation mechanism. Customary restrictions, selective harvesting, and culturally protected spaces operate as informal institutions that regulate access and use. In this sense, ethnobotanical knowledge contributes to conservation not only by identifying useful species, but by sustaining norms that prevent overexploitation. This supports current international scholarship showing that local ecological knowledge can inform conservation planning, particularly where scientific data are limited and community stewardship remains strong.

The study also has implications for science and biology education. The weakening of oral transmission reported by informants indicates that schools and higher education institutions should play a more active role in preserving local knowledge. Recent studies in science education show that integrating local wisdom into learning can improve scientific literacy, contextual understanding, and student engagement (Verawati & Wahyudi, 2024). Project-based ethnobotany learning has also been shown to strengthen ethnomedicine literacy among students, indicating that ethnobotanical content can be transformed into innovative pedagogical resources (Gani et al., 2024). Indonesian evidence likewise indicates that local-wisdom-based biology education is still underrepresented, even though it offers strong potential for contextual and culturally responsive pedagogy (Fauzi et al., 2024). Therefore, the ethnobotanical knowledge documented in this study can be transformed into contextual learning resources for biology, ethnoscience modules, community-based projects, and place-based conservation education.

From a reviewer perspective, the main strength of this article is its integration of three dimensions that are often separated in manuscripts: plant documentation, cultural interpretation, and conservation relevance. To make the paper more acceptable to an international audience, the discussion should avoid overly general claims about “all Dayak communities” and instead remain explicit that the findings are grounded in selected communities in West Kalimantan. The contribution is strongest when framed as a context-specific case study with broader relevance for Indigenous knowledge documentation, conservation, and culturally responsive education.

4. Conclusion

This study demonstrates that Dayak communities in West Kalimantan maintain extensive ethnobotanical knowledge related to medicinal, food, ritual, ecological, and material uses of plants. Plant use practices are closely tied to local wisdom, customary regulation, and community-based environmental stewardship. Ethnobotanical knowledge is still actively practiced, but its continuity is increasingly threatened by socio-cultural change and weakening intergenerational transmission. The study therefore underscores the urgency of documenting local plant knowledge as both cultural heritage and a practical resource for biodiversity conservation. It also highlights the potential of ethnobotanical knowledge to support context-based biology education and community empowerment. Future studies should strengthen botanical verification, quantify consensus and use value where possible, and explore collaborative models for integrating Indigenous knowledge into conservation and educational programs.

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